TECHNICAL MANUAL

UNIT AND DIRECT SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)

FOR
DECONTAMINATING APPARATUS: POWER DRIVEN, LIGHTWEIGHT,
M17
NSN 4230-01-251-8702
(WITH 1580-GAL WATER TANK)
M17A1
NSN 4230-01-303-5225
(WITH 3000-GAL WATER TANK)
M17A2
NSN 4230-01-346-1778
(WITH 1580-GAL WATER TANK)
M17A3
NSN 4230-01-346-3122
(WITH 3000-GAL WATER TANK)

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See inside cover for warning, distribution statement and destruction notice.

HEADQUARTERS, DEPARTMENT OF THE ARMY

15 SEPTEMBER 1989

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WARNINGS

Detailed operator Warnings are in the Operator's Manual, TM 3-4230-228-10.

The pump/heater assembly weighs over 360 pounds. To avoid back injury, use a minimum of four people to move the unit. When loading onto a transport vehicle, use a minimum of eight people or a loading ramp.

Cleaning solvent is toxic and flammable. Use only in a well-ventilated area. Avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts and avoid skin contact.

HIGH VOLTAGE is present on this equipment. Death or injury may result if personnel fail to observe all safety precautions.

To prevent injury, use care during maintenance actions when operating the unit with protective panels or covers removed.

Always wear protective clothing when performing descaling operation. Descaling chemicals can cause irritation to unprotected eyes and skin.

When checking spark plug and igniter plug for adequacy of spark be sure not to touch plug or cap with bare hand. Failure to heed this warning may result in injury from electric shock.

Solvents and adhesives used for repair of water tank are flammable. Perform repairs in a well-ventilated area, free of spark or flame.

Remove rings, bracelets, wrist watch and neck chains before starting work. Jewelry can catch on equipment and cause injury or may short across an electrical circuit and cause severe burns or electrical shock. Secure all loose clothing.

Alternate fuel ball pump assembly (OMC) does not allow fuel to be drained from fuel lines by squeezing bulb. Drain and relieve fuel line pressure by loosening hex head carburetor main jet, located at the bottom of the fuel bowl. Failure to do this could result in fuel being sprayed on personnel and equipment, causing injury or damage to equipment.

Refer to FM 21-11 for First Aid Information.

TM 3-4230-228-23&P
C3

CHANGE

NO. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *DATE TBD*

UNIT AND DIRECT SUPPORT MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)
FOR
DECONTAMINATING APPARATUS: POWER DRIVEN, LIGHTWEIGHT, M17
(NSN 4230-01-251-8702)

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TM 3-4230-228-23&P, 15 September 1989, is changed as follows:

1. Remove old pages and insert new pages as indicated below.

2. New or changed material is indicated by a vertical bar or asterisk in the margin of the page.

3. Added or revised illustrations are indicated by a vertical bar adjacent to the illustration or miniature pointing hands in the affected areas.

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a	a/(b blank)
None	A and B
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2-25 and 2-26	2-25 and 2-26
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Remove Pages	Insert Pages
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Index 1 through Index 6/(Index 7 blank)	Index 1 through Index 6
None	Instructions for Electronic 2028
Sample DA Form 2028	Sample DA Form 2028
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Front Cover	Front Cover
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4. File this change sheet in front of the publication for reference purposes.

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TECHNICAL MANUAL

NO. 3-4230-228-23&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., DATE

Unit and Direct Support Maintenance Manual
(Including Repair Parts and Special Tools List) for
DECONTAMINATING APPARATUS: POWER DRIVEN, LIGHTWEIGHT, M17
NSN 4230-01-251-8702 includes 1580-gallon Water Tank and 197cc Engine, M17
NSN 4230-01-303-5225 includes 3000-gallon Water Tank and 197cc Engine, M17A1
NSN 4230-01-346-1778 includes 1580-gallon Water Tank and 215cc Engine, M17A2
NSN 4230-01-346-3122 includes 3000-gallon Water Tank and 215cc Engine, M17A3
Current as of DATE TBD for Appendix C.

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) located in the back of this manual directly to: Commander, US Army Soldier and Biological Chemical Command, ATTN: AMSSB-RIM-L(N), Kansas St., Natick, MA 01760. You may also submit your recommended changes by E-mail directly to: <amssbriml@natick.army.mil>. A reply will be furnished directly to you. Instructions for sending electronic 2028 may be found at the back of this manual immediately preceding the hard copy 2028.

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HOW TO USE THIS MANUAL

Be sure to read all Warnings before using your equipment.

This manual contains Unit and Direct Support Maintenance instructions for the Decontaminating Apparatus: Power Driven, Lightweight, M17, and consists of the usual introductory information, 3 chapters, 6 appendices and an index:

- The introductory information includes a table of contents, instructions for preparing EIRs, and Warning notes.

- Chapter 1 introduces you to the equipment and gives you information such as weight, height, length, generally used abbreviations, cross reference information and principles of operation. The chapter is preceded by a full-page illustration of the equipment.

- Chapter 2 provides the maintenance instructions for Unit Maintenance and includes service upon receipt, preventive maintenance and troubleshooting information; detailed maintenance and repair procedures for the Unit Maintenance repairer and storage and shipment instructions.

- Chapter 3 contains the maintenance instructions for the Direct Support repairer and consists of troubleshooting information and repair/maintenance procedures.

- Appendix A gives you a list of frequently used forms and publications.

- Appendix B is the Maintenance Allocation Chart (MAC).

- Appendix C is the Repair Parts and Special Tools List (RPSTL). You will find this information helpful in finding repair parts and special tools information.

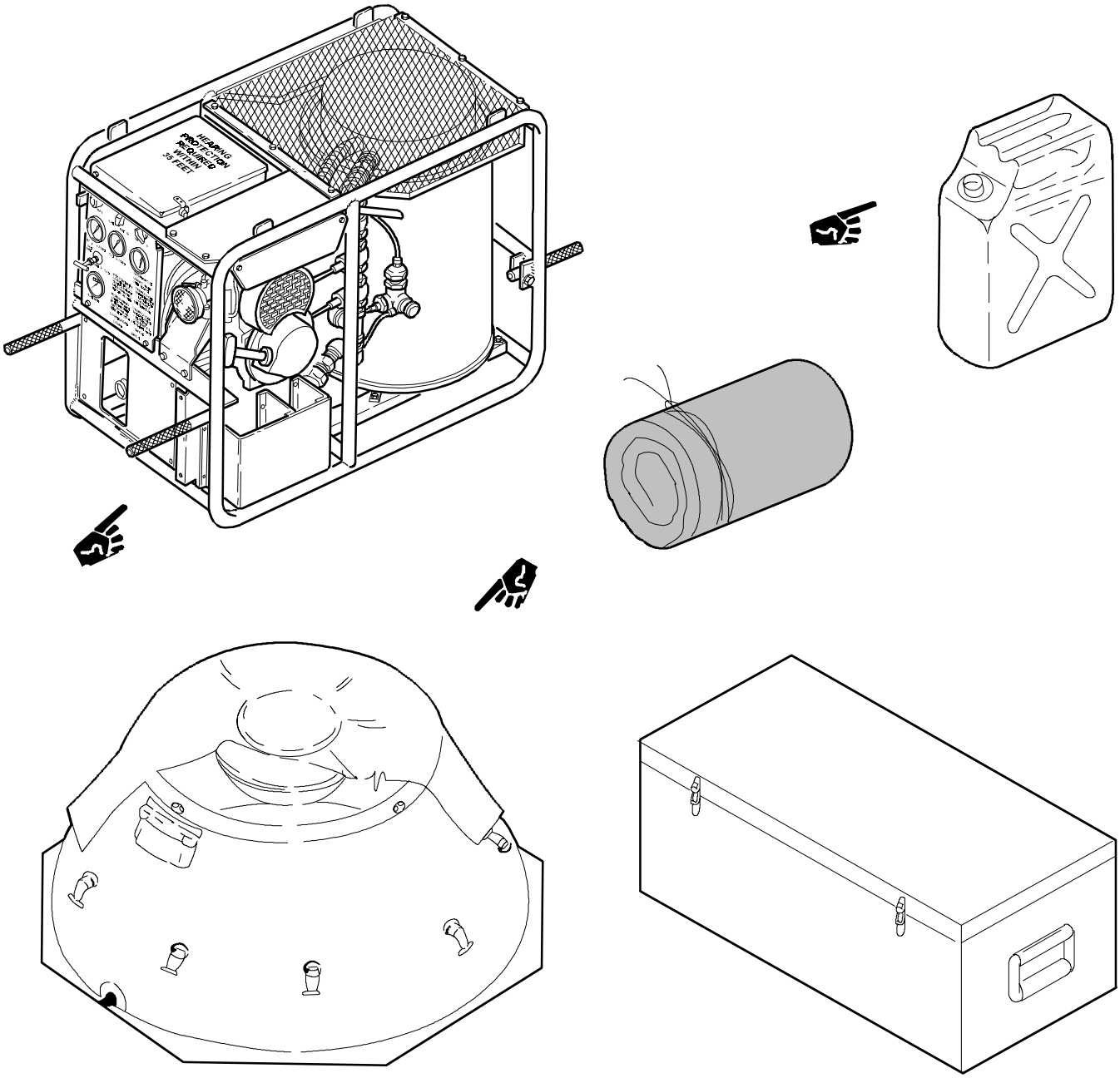
- Appendix D provides you with information about expendable supplies such as sealant, paint, lubricants, etc.

- Appendix E tells you how to make some of the special tools you need to maintain the M17. They are easy to make and you have access to the materials needed to make them. (See Appendix C for Bulk Items List).

- Appendix F is the System Schematic and Wiring Diagram. This information will be useful in supplementing your troubleshooting information at the Unit and Direct Support levels.

- The Alphabetical Index is the last item in the TM. You will find it useful in locating page numbers about specific information or procedures.

Becoming familiar with this manual and the Operator's Manual, TM 3-4230-228-10, will help you maintain this equipment in good working order.



NOT TO SCALE

CHAPTER 1

INTRODUCTION

Section I. General Information
Section II. Equipment Description and Data
Section III. Principles of Operation
Section IV. Repair Parts; Special Tools; Test, Measurement and Diagnostic Equipment (TMDE); and Support Equipment

Section I. GENERAL INFORMATION

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Maintenance Forms and Records	1-1	Corrosion Data Feedback	1-2
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1-1. SCOPE

a. Type of Manual. Unit and Direct Support Maintenance Manual including Repair Parts and Special Tools List (RPSTL).

b. Model Number and Equipment Name. The official equipment nomenclature is: Decontaminating Apparatus: Power Driven, Lightweight, M17.

c. Purpose of Equipment. This equipment is used to decontaminate equipment exposed to nuclear, biological, or chemical agents. It is used with water and water mixed with decontaminant. When using decontaminant the injector must be used. It also provides showers for personnel.

1-2. MAINTENANCE FORMS AND RECORDS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, Functional User's Manual for The Army Maintenance Management System (TAMMS).

1-3. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS

If your Decontaminating Apparatus needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on a SF 368 (Product Quality Deficiency Report). Mail it to us at Site Manager, Soldier and Biological Chemical Command (RI), ATTN: AMSSC-RSO-SDM (RI), 1 Rock Island Arsenal, Rock Island, IL 61299-7390; Fax: Commercial (309) 782-3126, DSN 793-3126; e-mail: amssc-rso-em@ria.army.mil. We'll send you a reply.

1-4. NOMENCLATURE CROSS REFERENCE LIST

Common Name	Official Nomenclature
Mica Window	Window, Observation
Spray Wand	Cleaning Gun, Water
M17	Decontaminating Apparatus: Power Driven, Lightweight, M17
Engine Stop Switch	Switch, Toggle
Injector	Injector System
Water Tank	Tank, Fabric, Collapsible
Low Temperature Cutout (LTCO) Switch	Transmitter, Temperature
High Temperature Cutout (HTCO) Switch	Transmitter, Temperature
Elapsed Time Meter	Meter, Time Totalizing
Override Switch	Switch, Toggle
Storage Tray	Weldment, Rack
32 Gallon Container	Can, 32 Gallon, Galvanized Steel
Engine Fuel Can	Can, Gasoline, Military, Engine
Heater Fuel Can	Can, Gasoline, Military, Heater
Water Pump	Pump, Water, Positive Displacement
Adapter	Mender, Hose Reducer
Tags	Tag, Stock Marking
Engine Mounts	Mount, Resilient
Fuel Pump	Pump, Rotary
Function Switch	Lever, Manual Control
Timing Gage	Dial Indicator
O-ring/Gasket	Preformed Packing
RPM Indicator	Tachometer

1-5. DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE

For procedures and materials used to destroy the Decontaminating Apparatus refer to TM 43-0002-31.

1-6. CORROSION DATA FEEDBACK

a. Corrosion Prevention and Control (CPC) of Army Materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.

b. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.

c. Such problems should be reported using SF 368 (Product Quality Deficiency Report). Send the form to:

Site Manager
Soldier and Biological Chemical Command (RI)
ATTN: *AMSSC-RSO-SDM (RI)*
1 Rock Island Arsenal
Rock Island, IL 61299-7390

Use of key words such as *"corrosion"*, *"rust"*, *"deterioration"*, or *"cracking"* will assure that the information is identified as a CPC problem.

Section II. EQUIPMENT DESCRIPTION AND DATA

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1-6.1. DIFFERENCES BETWEEN MODELS

a. The M17-series Decontaminating Apparatus has been issued in four configurations. The M17 and M17A1 models were equipped with 197cc JLO engines and with a 1580-gallon or 3000-gallon water tank, respectively. The M17A2 and M17A3 models were equipped with 215 cc Cuyuna engines and with a 1580-gallon or 3000-gallon water tank, respectively. All M17 and M17A1 models should have been modified by applying the Cuyuna engine conversion kit. Both the JLO engine and the 1580-gallon water tank are no longer supportable; all M17-series Decontaminating Apparatus systems should now match the M17A3 configuration (215 cc Cuyuna engine and 3000-gallon water tank). Check your equipment and be sure that these configuration changes have been made and that your property book manager lists the proper NSN for the M17A3 (4230-01-346-3122).

b. The configuration of the 215 cc engine fan housing and ignition trigger components differs between engines with serial numbers below 63247 and those with serial numbers 63247 and higher. These differences are annotated in the maintenance procedures and in Appendix C.

1-7. EQUIPMENT DATA (Refer to Table 1-1)

Table 1-1. Equipment Data

M17A3 DECONTAMINATING APPARATUS	
Pump Heater	
Weight	370 lbs (168 kg)
Length	42.2 in (102 cm)
Width	23.2 in (59 cm)
Height	33.9 in (86 cm)
Heater	
Type	Convection jet-fired igniter plug ignition
Heat output	700,000 Btu (180,000 Kilocaries per hour)
Primary fuel	Leaded or unleaded regular gasoline
Alternate fuel	Diesel (DF2), Jet Fuel (JP4), or kerosene
Fuel consumption	Approximately 9 gal (34 Liter) per hour
Igniter	Single electrode, spark producing element
Fuel pump	Belt Driven, gear type
Engine (215 cc Cuyuna)	
Type	Single cylinder, 2-cycle
Displacement	13.1 cu inch (215 cc)
Compression ratio	6.5 to 1
Output power	8 hp at 4250 rpm
Cooling	Air Cooled
Fuel required	Gasoline and oil (5 gal of gasoline mixed with 1 pt 2-cycle oil)
Lubrication	2-cycle oil mixed with gasoline
Normal engine rpm	4250 ± 50 rpm
Fuel consumption	Approximately 0.7 gal (2.7 liter per hour)

1-7. EQUIPMENT DATA - Continued

Table 1-1. Equipment Data - Continued

Starter type	Manual recoil
Ignition system	Capacitor - Discharge Ignition (CDI) without breaker points
Breaker point gap	Electronic Ignition
Timing (BTDC)	0.070 to 0.078 inch (1.8 to 2.0 mm)
Spark plug	Champion N3C or RN3C
Spark plug gap	0.035 to 0.040 inch (0.89 to 1.0 mm)
Electrical generator	Flywheel mounted, providing 32Vac (4.7 amps)
Power transfer	Centrifugal clutch with engagement at 2700 rpm
Water pump	Belt driven, self priming, medium pressure, over-capacity roller
Fan Assembly	Shrouded, axial vane

FUEL CAN

Engine Fuel Can	5 gal (18.9 liters)
Heater Fuel Can	5 gal (18.9 liters)

ACCESSORY KIT

Accessory Box	
Weight	143 lbs (65 kg)
Length	41.8 in (106 cm)
Width	20.5 in (52 cm)
Height	15.4 in (39 cm)
Suction Hose (1)	
Length	33 ft (10 m)
Coupling Type	Quick Disconnect
Branch Hose (1)	
Length	3 ft (0.9 m)
Coupling Type	Quick Disconnect
Capacity	250 psi
Pressure Hose (2)	
Length	50 ft (15 m)
Coupling Type	Quick Disconnect
Capacity	250 psi

Shower (2 sets)	
Type	3-section with 6 jets each
Coupling type	Quick Disconnect
Length	8 ft (2.44 m)
Spray Wand (2)	Single section, trigger actuator
Coupling type	Quick Disconnect
Length	3 ft (0.9 m)
Nozzle	Adjustable fan stream
Injector (1)	
Type	80/20 Siphon (4 parts water, 1 part decontaminant)
Coupling Type	Quick Disconnect
Water Tank:	M17A3
Type	Collapsible, self-erecting, rubberized fabric
Capacity	*3000 gal (11,400L)
Weight Empty	130 lbs (59 kg)
Weight Full	25,180 lbs (11,445 kg)
Dimensions (containerized) L x W x H	47.5" x 28.5" x 23"
Dimensions (set up & filled) Height & diameter	4.6' x 12.3'

*For additional information on the 3,000 gallon water tank refer to TM 10-5430-233-12&P.

Section III. PRINCIPLES OF OPERATION

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Principles of Operation of Air, Water, Heat Exchanger, Engine and Heater Fuel Systems	1-5
Electrical System Principles of Operation	1-5

1-8. PRINCIPLES OF OPERATION OF AIR, WATER, HEAT EXCHANGER, ENGINE AND HEATER FUEL SYSTEMS

Refer to TM 3-4230-228-10; Operator's Manual for Decontaminating Apparatus: Power Driven, Lightweight, M17, M17A1, M17A2, and M17A3; for the principles of operation for these systems.

1-9. ELECTRICAL SYSTEM PRINCIPLES OF OPERATION

a. Engine and EMERGENCY STOP Switch. The engine (See Electrical Control System Block Diagram, page 3-121.) produces the electrical power necessary to operate the system. The engine can be stopped quickly by using the ENGINE STOP switch which, when actuated, grounds out the ignition coil.

1-9. ELECTRICAL SYSTEM PRINCIPLES OF OPERATION - Continued

b. FUNCTION SELECTOR Switch. The selector switch, mounted on the control panel, provides for selection of desired maximum water temperature. In the OFF position, no heating is provided. In the SHOWERS mode, the Low Temperature Cutout (LTCO) switch is selected to prevent water temperatures above 43ºC (109.4ºF). In the WANDS mode, the LTCO switch is bypassed to permit the higher temperatures required for equipment decontamination. In the WANDS mode the HTCO switch is activated to prevent water temperatures above 117ºC (242.6ºF).

c. Photocell. The photocell is mounted on heat exchanger. Its purpose is to detect when fuel has been ignited and is burning in the combustion chamber. If ignition has not occurred, lack of a signal, provided by the photocell assembly, will result in turning off the supply of fuel to the nozzles.

d. Igniter, Voltage Tripler and Fuel Igniter Plug. The engine produces ac voltage, which is rectified in the control module and amplified by the igniter assembly to approximately 10 kilovolts. The voltage tripler further increases that voltage to approximately 30 kilovolts. The igniter plug produces the spark necessary for ignition.

e. High and Low Temperature Cutout Switches. The high and low temperature cutout switches (HTCO ant LTCO) are provided to maintain the hot water within a safe temperature range. Water temperatures above 117ºC will shut down the burner fuel supply in the WANDS mode, and temperatures above 43ºC will shut it down in the SHOWERS mode. In the WANDS mode the LTCO switch is bypassed.

f. High/Low Pressure Cutout and OVERRIDE Switches. The high pressure and low pressure cutout switches are provided to maintain the water pressure within safe operating limits. At water pressures above the upper limits, the burner fuel supply will be shut down by the high pressure cutout switch. It will also be shut down by the low pressure cutout switch if pressure goes below the lower limit.

g. The low pressure OVERRIDE switch is connected in parallel with the low pressure cutout switch, thus allowing selective override of the cutout switch. This allows the burner to ignite when there is insufficient back pressure (no accessories attached). The OVERRIDE switch is used when flushing the system with antifreeze and for descaling.

h. RESET Pushbutton and Lamp. The pushbutton performs a double function: (1) It is used to reset the electrical system, after it has been shut down by the photocell as a result of absence of combustion. This condition could result from lack of fuel, insufficient spark or both. (2) The lamp within the pushbutton is provided to inform the operator if ignition has failed (lamp lights).

i. Flow Switches. The flow switches monitor the flow of water in the system. If only one wand is operated, one switch will close its contacts and allow fuel flow through one jet. If both wands, showers or injector are on, both switches will close, causing fuel to flow through both fuel nozzles.

j. Solenoid Fuel Valves. These valves are designed to open when voltage is applied at their input terminals. Fuel cannot be delivered to the burners unless one or both valves are energized.

k. Electrical Control Module. The electrical control module is enclosed by the junction box. It is a potted, throw-away module that contains the rectifier, diodes, relays, transistors and other electronic components that control the functions of the external electrical components.

CHAPTER 2

UNIT MAINTENANCE INSTRUCTIONS

Section I. Service Upon Receipt
Section II. Preventive Maintenance Checks and Services (PMCS)
Section III. Unit Maintenance Troubleshooting Procedures
Section IV. Unit Maintenance Procedures
Section V. Preparation for Storage or Shipment

Section I. SERVICE UPON RECEIPT

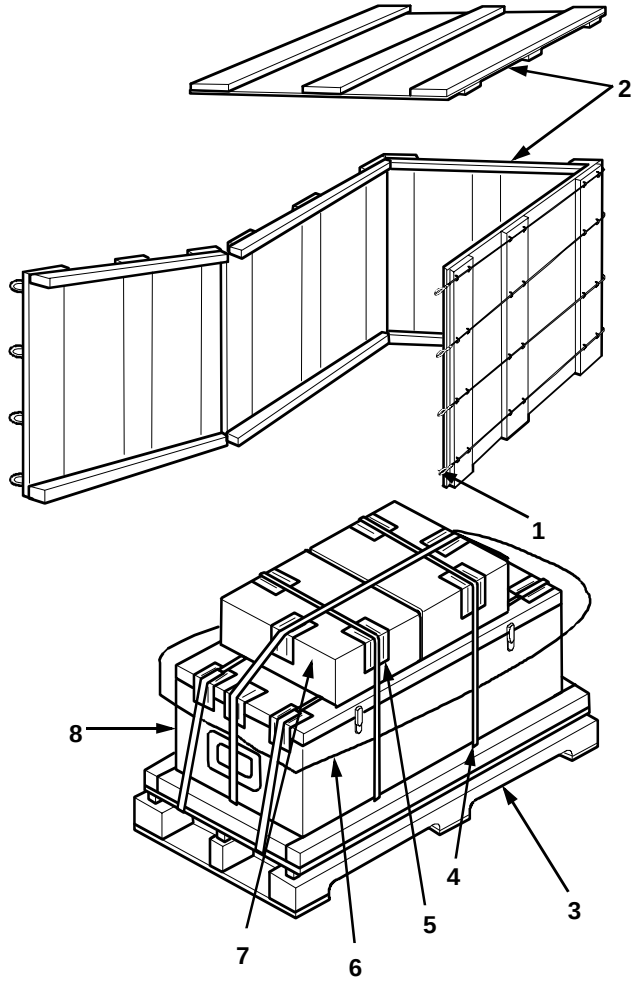
	Page		Page
Unpacking Equipment	2-1	Checking Unpacked Equipment	2-2.2

2-1. UNPACKING EQUIPMENT

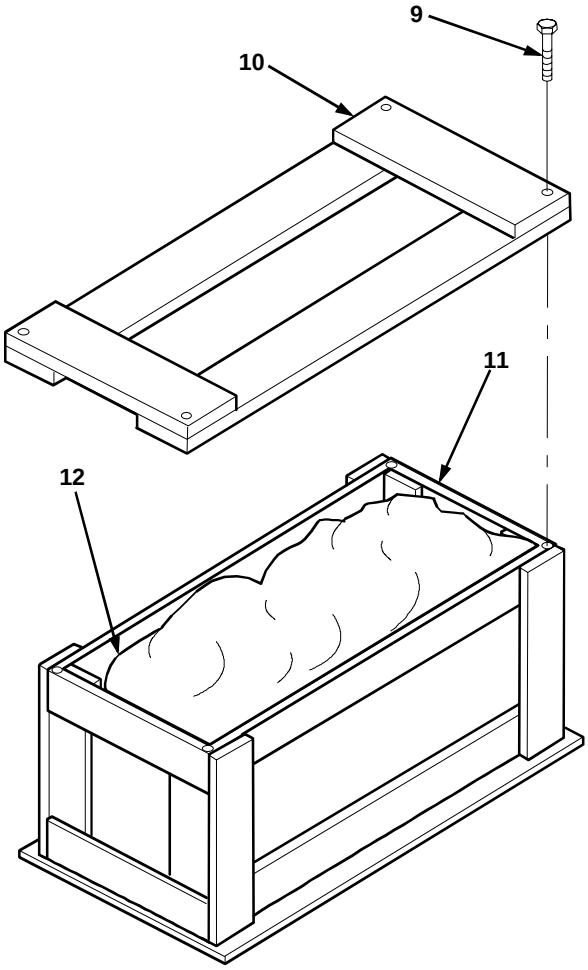
a. Cut banding straps and undo binding wires (1) of pallet box (2). Remove pallet box (2) from base (3).

b. Cut banding straps (4). Remove twelve corner angles (5) and plastic sheet (6).

c. Remove two boxed fuel cans (7) and accessory kit (8) from base (3).



2-1. UNPACKING EQUIPMENT - Continued



d. Remove lag bolts (9) and lid (10) from water tank box (11).

e. Remove water tank (12) from water tank box (11).

f. Cut banding straps and undo binding wires (13) of pallet box (14). Remove pallet box (14) from base (15).

g. Cut banding straps (16). Remove four corner angles (17) and fiberboard cap (18).

h. Remove dust cover (19).

i. Remove tape from exhaust of the heat exchanger (20), outlet assembly (21), pressure relief valve (22), carburetor air filter (23), water inlet assembly (24) and photocell tube (25).

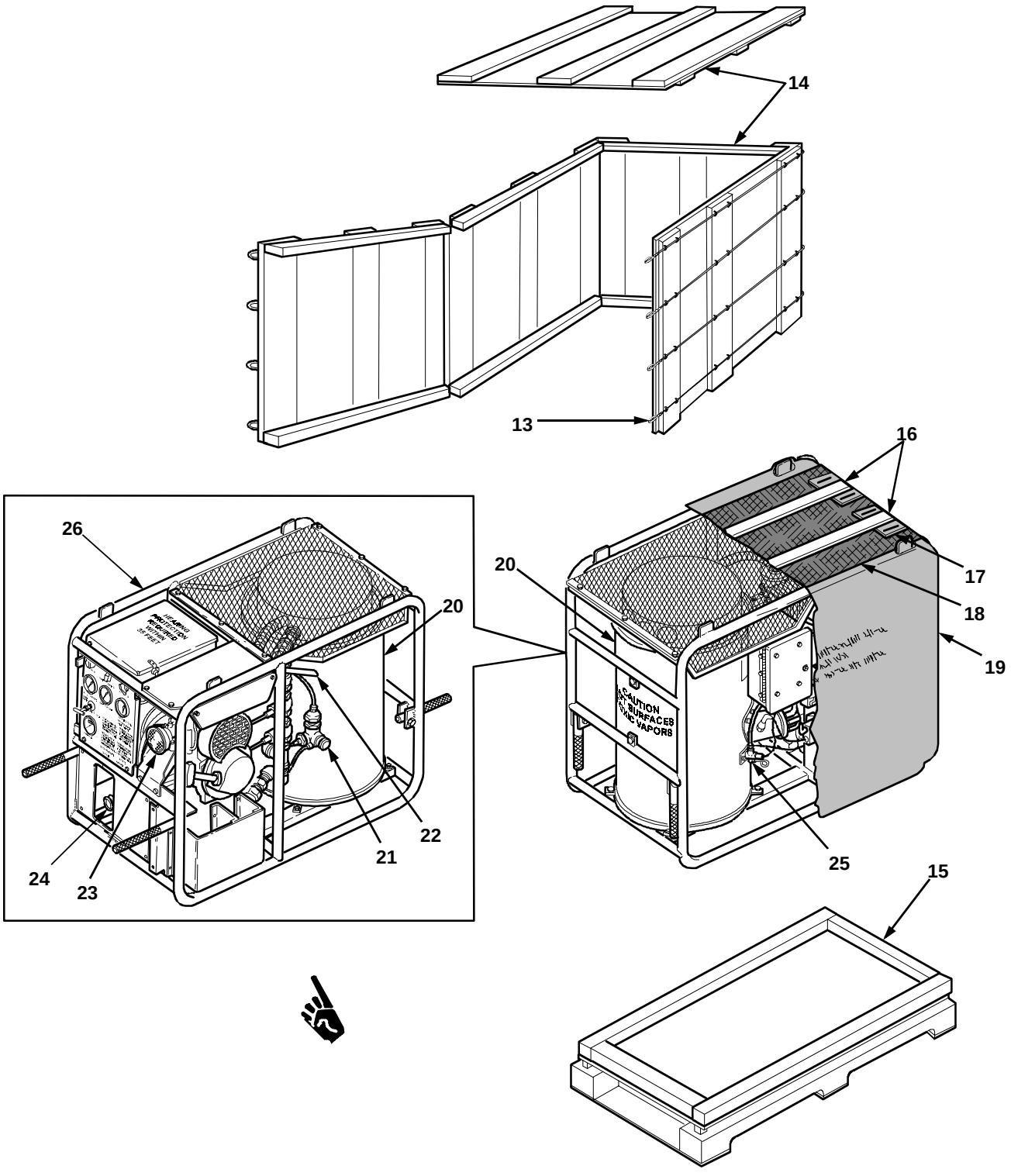
j. Using wiping rags (item 17, App D) and cleaning solvent (item 21, App D), remove tape residue from all surfaces.

WARNING

The pump/heater assembly weighs over 360 pounds. To avoid back injury, use a minimum of four people to move the unit. When loading onto a transport vehicle use a minimum of eight people or a loading ramp.

k. Using a minimum of four people, lift pump/heater assembly (26) from base (15).

l. Install water and fuel pump belts (page 2-26).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2-2. CHECKING UNPACKED EQUIPMENT

a. Inspect equipment for damage incurred during shipment. If equipment has been damaged, report damage on SF 364, Report of Discrepancy (ROD).

b. Check equipment against packing slip to see if shipment is complete. Report all discrepancies in accordance with instructions of DA PAM 738-750. See that special tools, components of end item and basic issue items are with the equipment. Technical manuals must be present.

c. Check to see whether equipment has been modified. Refer to DA PAM 738-750.

d. Reject if parts are missing, deformed, show obvious physical damage, rust and corrosion.

e. Inspect to make sure stencil markings are present and readable. (See TM 3-4230-228-10.)

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

	Page		Page
Introduction	2-4	Preventive Maintenance Checks and Services (PMCS) Schedule	2-5

2-3. INTRODUCTION

a. General. This section contains the procedures and instructions necessary to perform unit PMCS. These services are to be performed by Unit Maintenance personnel with the assistance, where practical, of the operator/crew.

b. Item Number Column. Checks and services are numbered in chronological order regardless of interval. Use this column as the source of item numbers when recording PMCS results in the "TM Number" column on DA Form 2404, Equipment Inspection and Maintenance Worksheet.

c. The Interval Columns tell you when to do a certain check or service. Sometimes a dot may be placed in more than one interval column which would mean you should do the check or service at each of those intervals.

S = Semi-annual	-	every 180 days or 25 hours of operation, whichever is first.
A = Annual	-	once every year or every 50 hours of operation, whichever is first.
B = Biennially	-	once every 2 years or every 100 hours of operation, whichever is first.
H = Hourly	-	as indicated. (Hours of operation are indicated on the HOURS meter located on your control panel.)

d. Items to be Inspected Column. The items listed in this column are identified by their common names.

e. Procedures Column. This column briefly describes the procedure to be checked. It contains all information required to accomplish the checks and services, including appropriate tolerances, adjustments and gage readings.

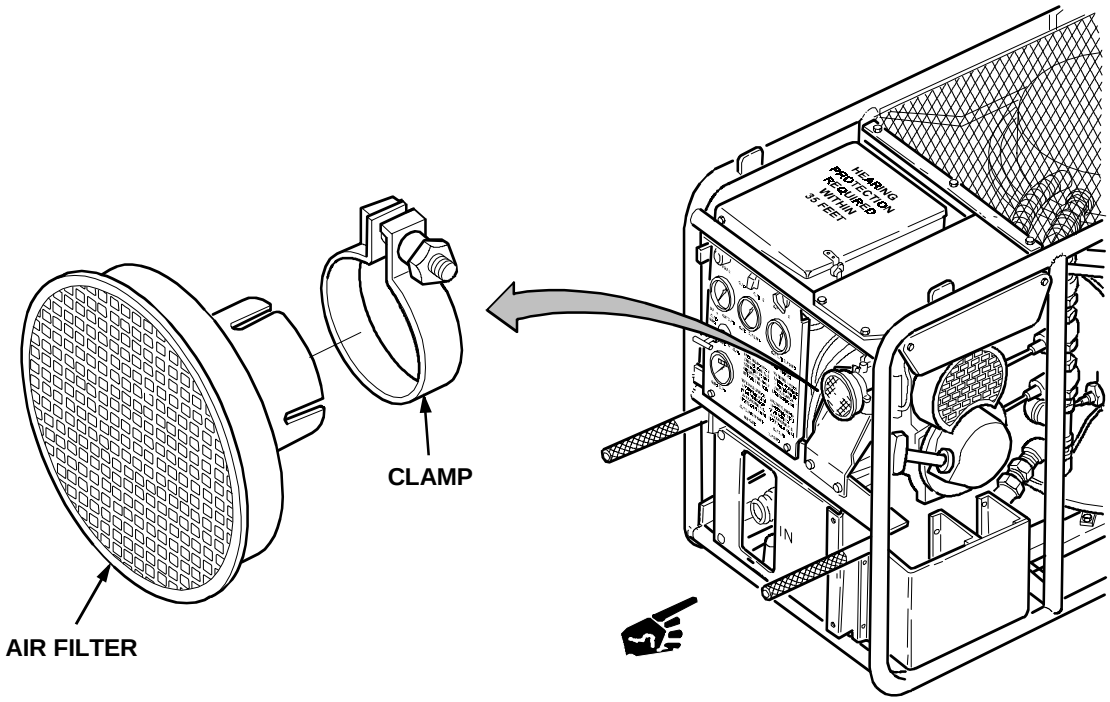
f. Prior to Storage or Shipment. A complete PMCS will be performed prior to storage or shipment.

g. Under Unusual Conditions. Servicing of your unit is required more often when operating in extreme conditions. Servicing more often is also required after operating in dust, mud or sand. Local SOP will authorize changes of the PMCS intervals when the unit is operated under unusual conditions.

h. Ecology and Conservation. Spilling of fuel damages our ecology. Always use a suitable container to catch spilled fuel when opening fuel/fluid lines. Immediately wipe up spilled fuels with rags.

2-4. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) SCHEDULE

Item No.	Interval S	A	B	H	Items to be Inspected	Procedure
1	•				Safety Shutdown/ Reset Circuits	Remove fuel pump belt (page 2-26) and operate system (See TM 3-4230-228-10) for maximum of 5 minutes. Note if RESET pushbutton lights. If RESET button does not light, refer to MALFUNCTION 18 (page 2-19).
2	•				Carburetor Air Filter	Loosen clamp and remove clamp and filter. Wash filter in cleaning solvent (item 21, App D) and shake dry. Install filter with clamp and apply a light coat of oil (item 12, App D) with a rag (item 17, App D) to outer surface of filter.

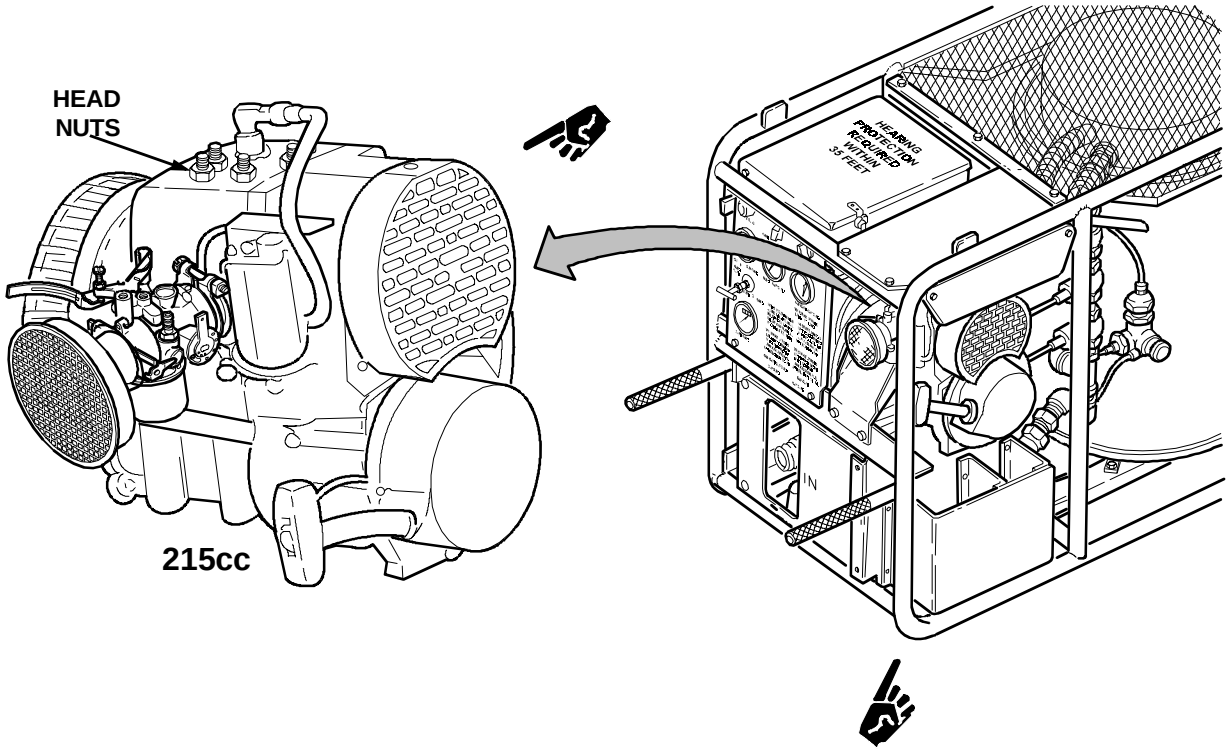


3	•				Mica Window	Replace (page 2-30).

2-4. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) SCHEDULE - Continued

Item No.	Interval S	A	B	H	Items to be Inspected	Procedure
4	•				Branch Hose Strainer	Inspect branch hose strainer and clean if required (page 2-90). Inspect strainer body and element for scale buildup. If scale buildup is 1/16 inch or greater, perform descaling procedure (page 2-82).
5					Deleted	
		•			Engine Spark Plug (215cc Engine)	Replace, verify gap is 0.035 to 0.040 in. (page 2-43).
6		•			Heater Fuel Filter	Replace element (page 2-68).
7		•			Engine Mounts	Check for loose, cracked or improperly adjusted mounts (steps a through e, page 2-40). Tighten/adjust as necessary. If mounts are damaged, notify your supervisor.

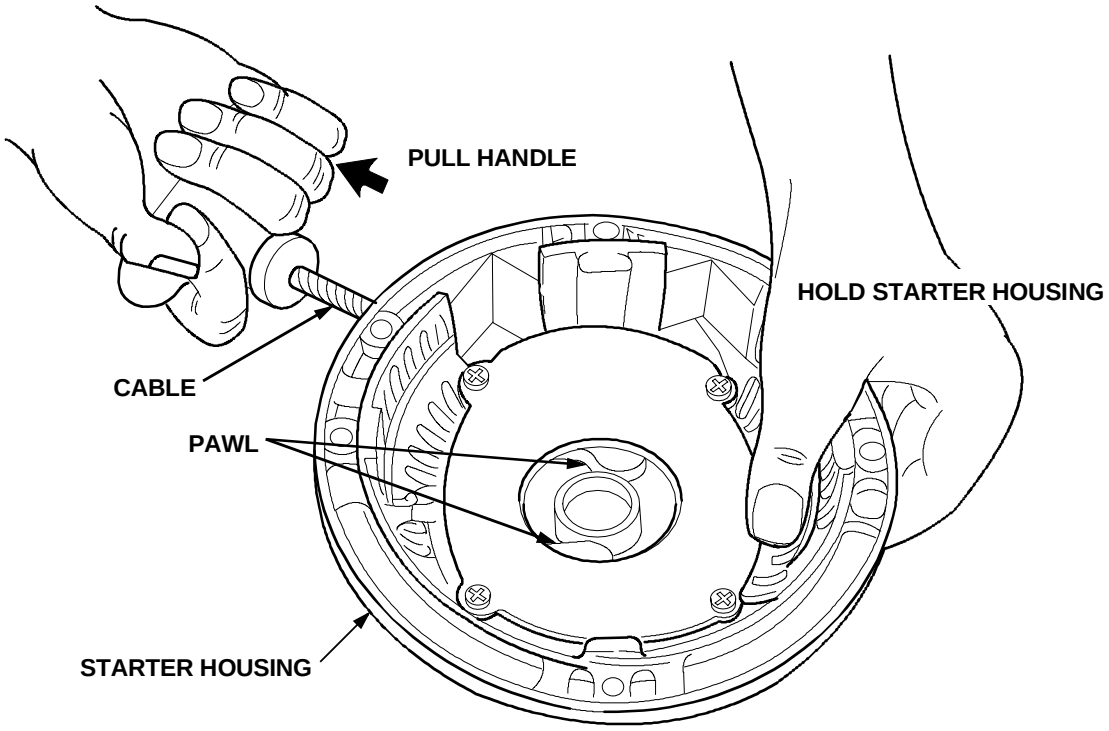
Item No.	Interval S	A	B	H	Items to be Inspected	Procedure
8			•	20	*Engine Cylinder Head Nuts (215cc)	Verify torque. Cross torque to 16-18 ft-lb (page 3-117).



*Check torque initially 20 hours after replacing gasket; thereafter, biennially.

2-4. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) SCHEDULE - Continued

Item No.	Interval S	A	B	H	Items to be Inspected	Procedure
9				200	Burner Assembly	Service (page 2-79).
10				200	Carburetor	Service (page 2-48).
11					Deleted	
12				300	Engine Recoil Starter	Remove starter (page 2-47.2) and examine for frayed cable, worn or inoperable pawls and broken handle. Pawls must be extended as shown when cable is pulled. Reinstall starter (page 2-47.3).



Section III. UNIT MAINTENANCE TROUBLESHOOTING PROCEDURES

	Page		Page
Introductory Information	2-9	Unit Maintenance Troubleshooting Table	2-12
Symptom Index	2-9		

2-5. INTRODUCTORY INFORMATION

a. The Symptom Index lists the common malfunctions which you may find during the operation or maintenance of the Decontaminating Apparatus or its components. Look at the Malfunction List until you find the one that you are having. Then go to the page listed and perform the troubleshooting test or inspections listed therein. The corrective action step will direct you to the proper paragraph for performing the corrective action.

b. This manual cannot list all malfunctions that may occur, nor list all the tests or inspections and corrective actions. If a malfunction is not listed or it is not corrected by the listed corrective actions, notify your supervisor.

c. Troubleshooting of the M17 may require the system to be in operation. Read and be thoroughly familiar with the operating procedures and warnings which are found in your Operator's Manual, TM 3-4230-228-10, prior to working on your equipment.

2-6. SYMPTOM INDEX

Malfunction No.	Malfunction	Page
21	Both jets on (only one wand activated)	2-21
13	Burner continues to operate	2-19
10	Burner cycles excessively	2-18
14	Elapsed time (HOURS) meter inoperative	2-19
1	Deleted	
23	Engine fails to start or stops - 215cc Engine	2-21.0
2	Deleted	
24	Engine runs roughly or lacks power/speed - 215cc Engine	2-21.5
3	Deleted	
25	Engine overheats - 215cc Engine	2-21.7
4	Deleted	
26	Excessive noise and vibration - 215cc Engine	2-21.7
6	Low water flow - inability to develop pressure	2-14
8	No burner function - no ignition - 215cc Engine	2-15
9	Low water temperature	2-18
16	No heating (shower mode only)	2-19
22	No override capability (low pressure override switch open)	2-21
5	No water flow, no pressure	2-12
18	Reset lamp is off when burner fails to ignite	2-19
11	Temperature too high (shower mode)	2-19
12	Temperature too high (wand mode)	2-19
19	Unable to reset at RESET pushbutton	2-20
20	Unable to stop engine with ENGINE STOP switch	2-20
7	Water discharge through pressure relief valve	2-15
15	Water pressure gage inoperative	2-19
17	Water temperature gage inoperative	2-19

All data on pages 2-10 and 2-11 deleted

2-7. UNIT MAINTENANCE TROUBLESHOOTING TABLE

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. Deleted

2. Deleted

3. Deleted

4. Deleted

5. NO WATER FLOW - NO PRESSURE

Step 1. Check for broken/missing or loose water pump belts (page 2-26).

Replace belts as necessary (page 2-26).

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 2. Remove bolt and washer and check for sheared key on water pump pulley. Key is sheared if pulley turns and pump shaft remains stationary.

If key is sheared replace as follows:

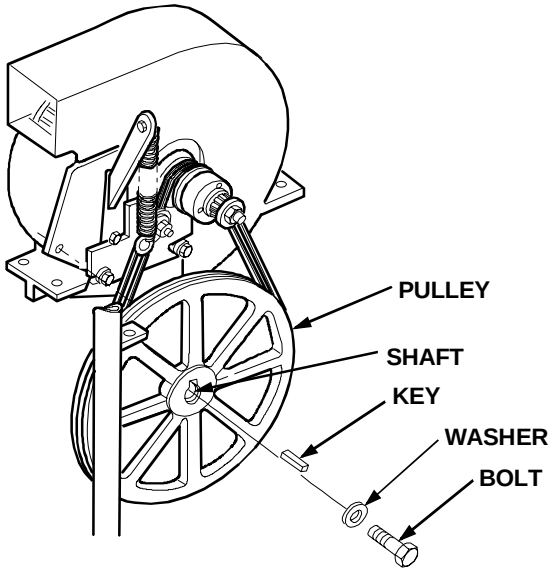
a. Remove belts (page 2-26).

b. Remove bolt and washer.

c. Remove pulley from water pump shaft.

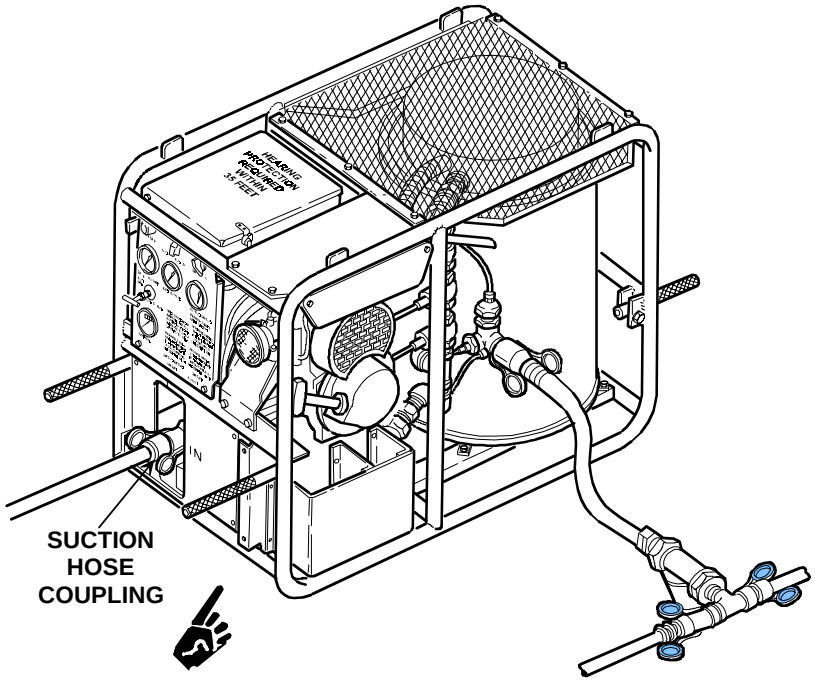
d. Remove damaged key, clean shaft with rags (item 17, App D) and inspect for damage. Remove burrs as necessary.

e. Position replacement key on shaft and install pulley. Secure with bolt and washer and install water pump belts (page 2-26).



Step 3. Check for missing/damaged gasket in suction hose coupling.

Replace missing/damaged gasket.



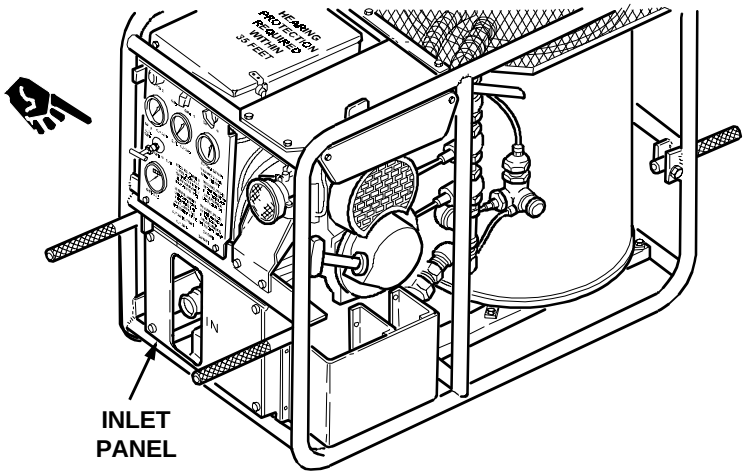
2-7. UNIT MAINTENANCE TROUBLESHOOTING TABLE - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

5. NO WATER FLOW - NO PRESSURE - Continued

Step 4. Remove inlet panel and repair water inlet assembly by removing dirt and debris from pump (page 2-78). If internal damage is noted, replace water inlet assembly (page 2-74).

Notify Direct Support Maintenance if trouble persists.



6. LOW WATER FLOW - INABILITY TO DEVELOP PRESSURE

Step 1. Check for loose/damaged water pump belts and belt tensioner assembly.

Replace belts (page 2-26) if damaged or missing.

If belts are loose, adjust water pump belts (page 2-31) or repair and adjust tensioner (page 2-31).

Step 2. Check for missing/damaged gasket in suction hose coupling (step 3, page 2-13).

Replace defective/missing gasket.

Step 3. Remove inlet panel and repair water inlet assembly by removing dirt and debris from pump (page 2-78). If internal damage is noted, replace water inlet assembly (page 2-74).

Step 4. Check/adjust engine speed (page 2-51).

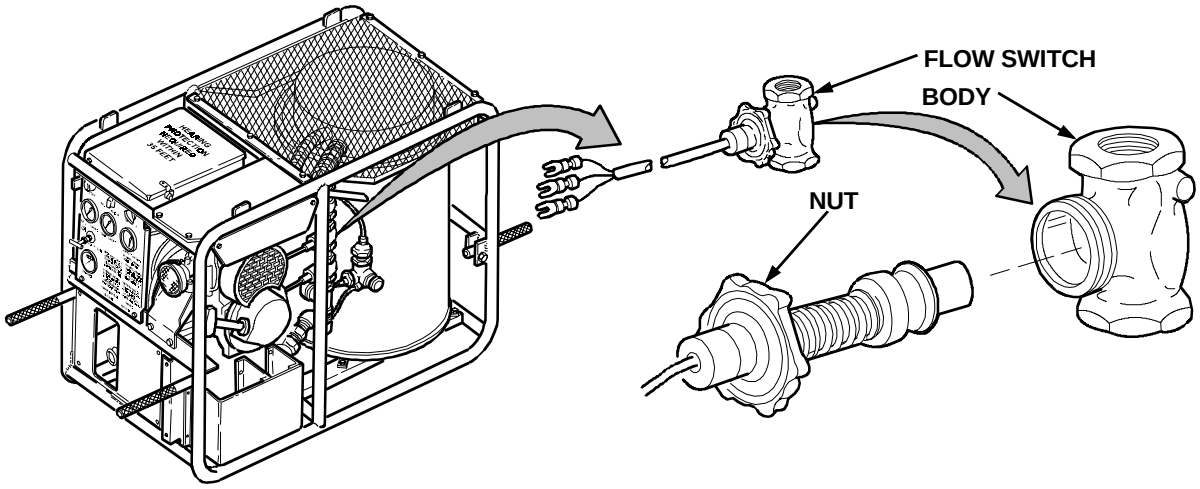
Notify Direct Support Maintenance if trouble continues.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

7. WATER DISCHARGE THROUGH PRESSURE RELIEF VALVE

Step 1. Disconnect nut from body of both flow switches and inspect switch mechanism for broken spring, dirt and corrosion and freedom of movement.

Clean as necessary using clear water. If defective mechanism is found or trouble persists, notify Direct Support.



8. NO BURNER FUNCTION – NO IGNITION – 215cc ENGINE

Step 1. Check fuel pressure at control panel. If fuel pressure is significantly below normal (95-105 psi), repair filter (page 2-68). If fuel pressure remains low, replace fuel pressure regulating valve (page 2-65). If fuel pressure is still low, replace fuel pump (page 2-34).

Step 2. Check for spark at igniter plug as follows:

WARNING

Be sure to follow these procedures when checking plug for spark. Failure to do so could result in electrical shock and/or ignition of surrounding fuel. Keep plug away from open fuel lines.

a. Shut down engine and turn function selector switch to WANDS or SHOWERS.

b. Check for fuel leakage in immediate vicinity of burner assembly. Wipe off fuel as necessary.

c. Remove igniter plug boot and igniter plug from burner assembly and reconnect igniter plug boot to igniter plug.

2-7. UNIT MAINTENANCE TROUBLESHOOTING TABLE - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

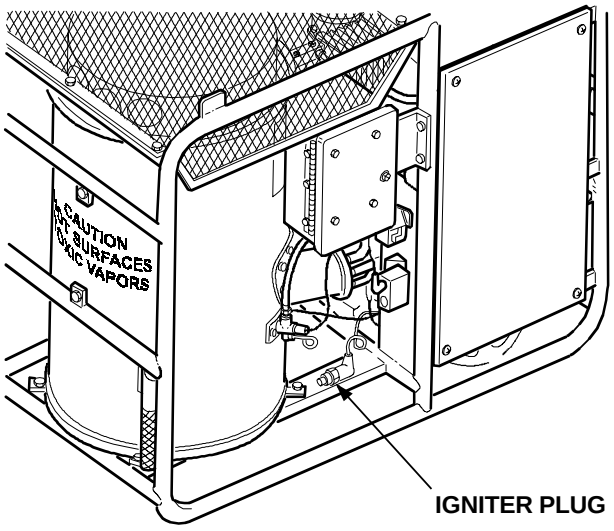
8. NO BURNER FUNCTION – NO IGNITION – 215cc ENGINE - Continued

NOTE

It may be necessary to shield the igniter plug from sunlight when performing the spark check to determine the presence and intensity of the spark.

d. Remove drive side panel and remove belt from fuel pump (page 2-26).

e. Position electrode approximately 1/8 inch away from a good ground. (Two people required). Start engine and operate at maximum rpm. Look for spark between igniter plug and ground.



If spark is absent or weak (normal spark is plainly visible and bluish in color), replace igniter plug and repeat step 2. If spark is still bad go to next step.

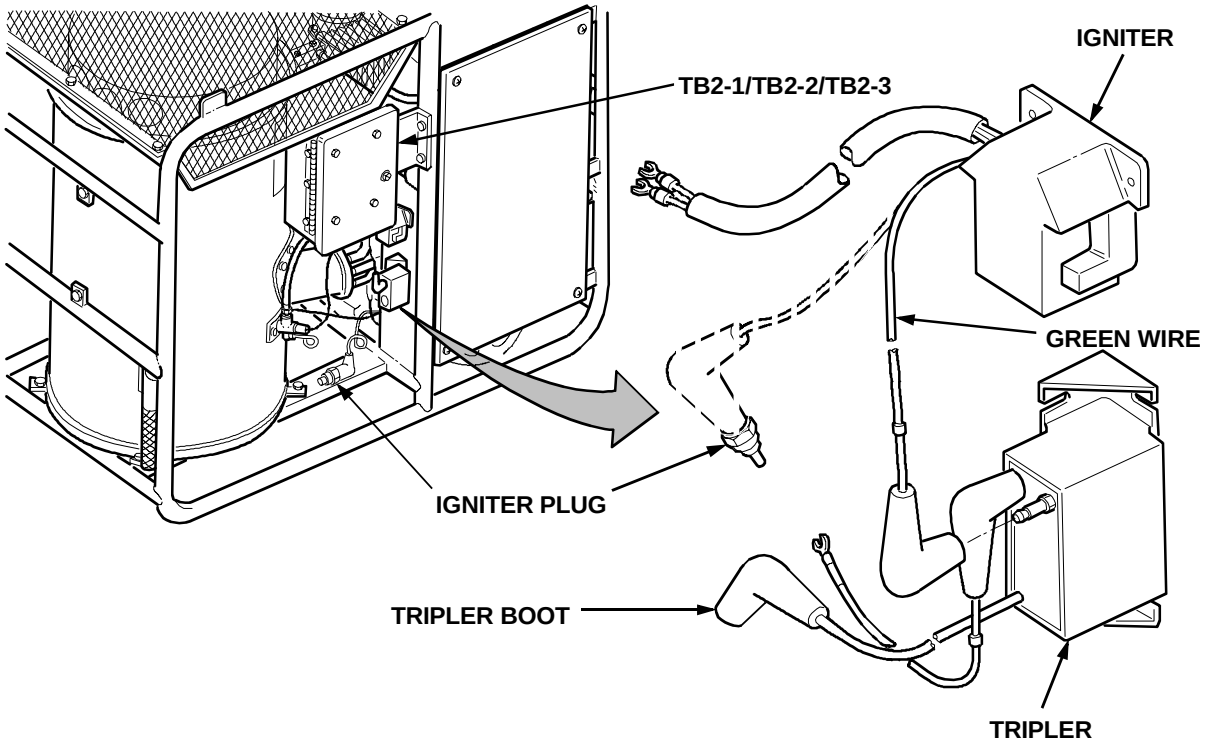
If spark exists, proceed to step 7.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

8. NO BURNER FUNCTION – NO IGNITION – 215cc ENGINE - Continued

Step 3. Check Voltage Tripler.

Detach igniter plug from tripler boot. Attach igniter plug to boot of igniter assembly.



Repeat check for spark in step 2. If spark exists, replace tripler (page 2-27).

Step 4. Check Igniter Assembly.

Using a multimeter, set to DC scale, measure voltage between terminals TB 2-1 and TB 2-3. With the engine operating at maximum rpm and the mode selector switch set to either WANDS or SHOWERS, a reading of not less than 5 volts DC should be observed. If input voltage to the igniter is 5 volts or greater and there is no spark at the output, the igniter assembly is defective. Replace igniter assembly (page 2-29).

2-7. UNIT MAINTENANCE TROUBLESHOOTING TABLE - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

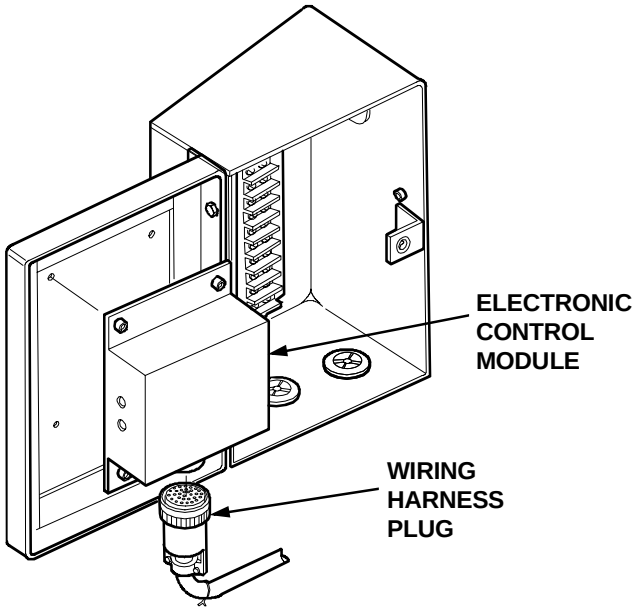
8. NO BURNER FUNCTION – NO IGNITION – 215cc ENGINE - Continued

Step 5. Check Electronic Control Module.

With the engine operating at maximum rpm and the function selector switch set to either WANDS or SHOWERS check input voltage to electronic module.

Set multimeter to the AC scale. Measure voltage between terminals TB 2-1 and TB 2-2. If at least 5 volts AC voltage is measured and there is no DC output voltage measured between TB 2-1 (ground) and TB 2-3, the electronic control module may be defective. One additional check should be made prior to the replacement of the control module. With the engine off, set the mode selector switch to either WANDS or SHOWERS.

Detach the wiring harness plug from the Electronic Control Module. Check for continuity between TB 2-3 and TB 2-4. If continuity exists, refer to Direct Support Maintenance for repair.



If no continuity exists, the mode selector switch is defective and must be replaced. Refer to Direct Support Maintenance for repair.

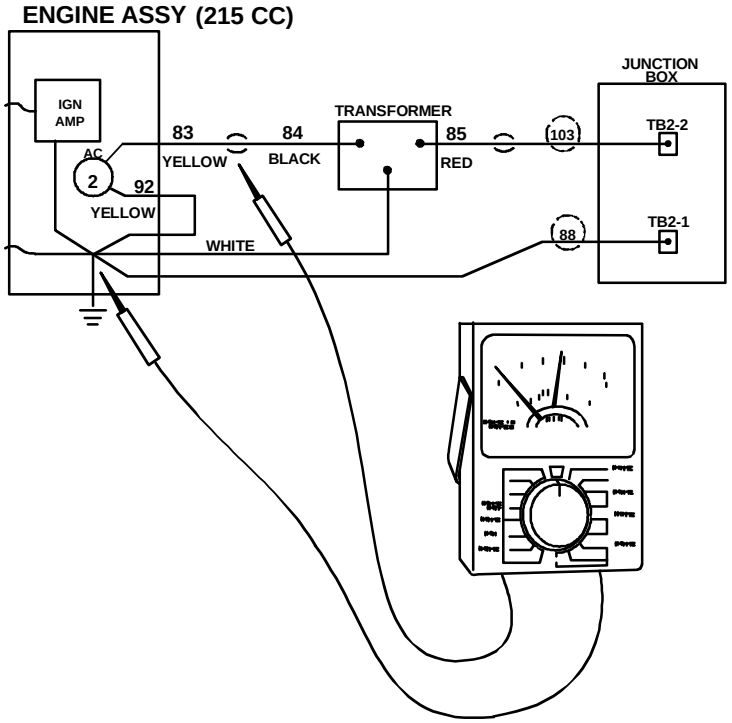
MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

8. NO BURNER FUNCTION – NO IGNITION – 215cc ENGINE - Continued

Step 6. Check engine electrical output.

With the engine operating at maximum rpm and the mode selector switch set to either WANDS or SHOWERS, check voltage output between terminals TB 2-1 and TB 2-2.

If a reading of less than 5 volts AC exists, the transformer must be checked prior to referring to Direct Support for stator maintenance. The transformer is located on the back of the storage box (page 2-40.1). Using a multimeter set to AC scale, check for engine output voltage between the connector (of the engine yellow wire #83 and black wire #84) and engine ground. A voltage reading of at least 25 volts should be observed at maximum engine rpm.



2-7. UNIT MAINTENANCE TROUBLESHOOTING TABLE - Continued

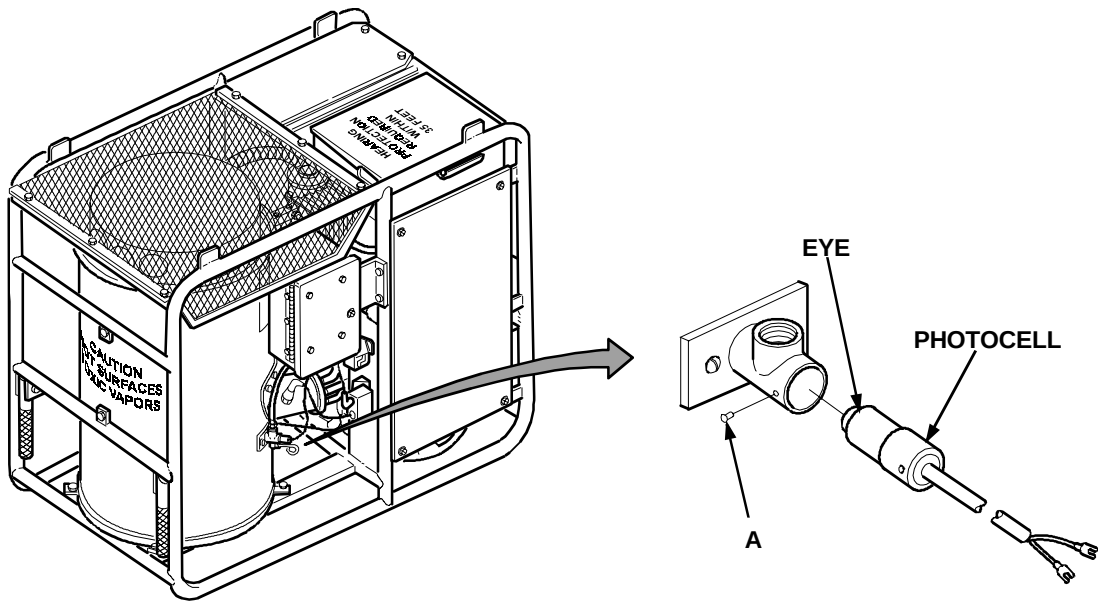
MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

8. NO BURNER FUNCTION – NO IGNITION – 215cc ENGINE - Continued

If a reading of less than 25 volts AC is observed, refer to Direct Support for engine stator inspection and replacement.

Step 7. Check photocell resistance.

When performing a check of the photocell, refer to the wiring diagram in App F. Open junction box door and disconnect blue lead No. 33 from terminal TB 2-5.



Loosen screw "A" and remove photocell from "Tee." Using a multimeter, read resistance between lead No. 33 and terminal TB 2-6, while pointing the eye of the photocell toward a light source (light bulb, flashlight, headlight, or sun).

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

8. NO BURNER FUNCTION – NO IGNITION – 215cc ENGINE - Continued

If the resistance is greater than 30 kilo-ohms while pointing the eye of the photocell toward a light source and less than 3 mega-ohms when the eye is covered, the photocell is defective and must be replaced (page 2-60). Install photocell on "tee" and tighten screw "A," being careful not to crack photocell housing.

Step 8. Service fuel nozzles (page 2-79).

Step 9. Check for low engine speed (page 2-51).

Step 10. If failure occurred in WANDS, press RESET button and switch to SHOWERS; or if failure occurred in SHOWERS, switch to WANDS.

If fuel ignites in one mode but not in other mode, notify Direct Support Maintenance.

2-7. UNIT MAINTENANCE TROUBLESHOOTING TABLE - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

9. LOW WATER TEMPERATURE

Step 1. Check fuel pressure at control panel.

If normal pressure of 95 - 105 psi is indicated, go to step 4; if pressure is low, proceed with step 2.

Step 2. Remove drive side panel (page 2-32) and check for worn or damaged fuel pump belt and belt tensioner.

Replace belt (page 2-26) if broken, worn or damaged; repair/replace tensioner (page 2-38) if unserviceable.

Step 3. Check for return fuel flow by unscrewing burner fuel can cap and lifting hoses up high enough so that return flow from smaller hose is visible and bottom of supply hose is still submerged. Check fuel lines and fittings for obstructions or loose fittings.

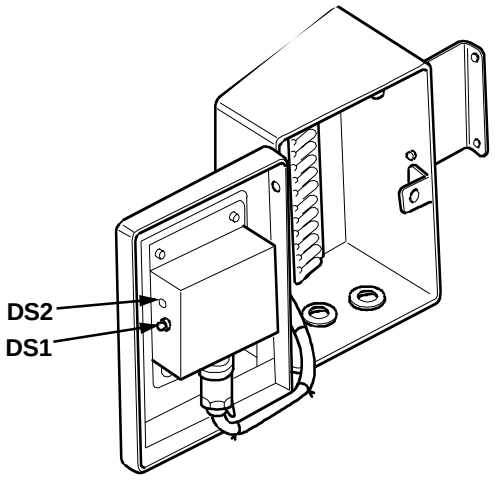
If steady, vigorous return flow is noted, replace fuel pressure regulating valve (page 2-65).

If steady, vigorous flow is <u>not</u> noted, repair filter (page 2-68) and, if trouble persists, check fuel lines and fittings for obstructions or loose connections.

Step 4. Check if Light Emitting Diodes (LEDs) on side of electronic control modules are illuminated.

If both LEDs are on in shower mode or with both wand triggers depressed, service burner assembly (page 2-79).

If only one LED is on in shower mode or with both wand triggers depressed, check and clean upper flow switch (page 2-15). If trouble persists notify Direct Support Maintenance.



10. BURNER CYCLES EXCESSIVELY

NOTE

Burner cycling is normal in WANDS, but can be reduced in SHOWERS by adjusting the flow of fuel at the manual fuel valve.

Notify Direct Support Maintenance if this condition occurs.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

11. TEMPERATURE TOO HIGH (Shower Mode)

Notify Direct Support Maintenance if this condition exists.

12. TEMPERATURE TOO HIGH (Wand Mode)

Notify Direct Support Maintenance if this condition exists.

13. BURNER CONTINUES TO OPERATE

Notify Direct Support Maintenance if this condition exists.

14. ELAPSED TIME (HOURS) METER INOPERATIVE

Using a multimeter, check continuity between negative terminal on meter and TB1-12. Repeat check between positive terminal on meter and TB1-4. (Refer to App F wiring diagram.) If connection is loose, tighten it. If continuity does not exist, replace broken wire.

If continuity exists, replace hours meter (page 2-70).

15. WATER PRESSURE GAGE INOPERATIVE

Notify Direct Support Maintenance if this condition exists.

16. NO HEATING (Shower Mode Only)

Notify Direct Support Maintenance if this condition exists.

17. WATER TEMPERATURE GAGE INOPERATIVE

Notify Direct Support Maintenance if this condition exists.

18. "RESET" LAMP IS OFF WHEN BURNER FAILS TO IGNITE

NOTE
Refer to System Schematic and Wiring Diagram (App F) as necessary.

Step 1. Remove switch guard (page 2-24), and check for continuity across lamp - contacts X1 to X2 on pushbutton.

If open, replace bulb (page 2-70).

2-7. UNIT MAINTENANCE TROUBLESHOOTING TABLE - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

18. "RESET" LAMP IS OFF WHEN BURNER FAILS TO IGNITE - Continued

Step 2. Check wiring by measuring continuity between the following points:

TB3-6	-	X2 (on pushbutton)
TB3-5	-	X1 (on pushbutton)
TB3-6	-	TB2-14
TB3-5	-	TB2-13
TB2-14	-	P1-W (plug on wiring harness)
TB2-13	-	P1-V (plug on wiring harness)

If continuity does not exist in any of the above checks, tighten all connections. If continuity remains absent, notify Direct Support Maintenance.

Notify Direct Support Maintenance if trouble persists.

19. UNABLE TO RESET AT "RESET" PUSHBUTTON

Refer to System Schematic and Wiring Diagram (page F-1) as necessary.

Step 1. Remove switch guard (page 2-24) and check wiring by measuring continuity as follows:

Contact 1 (pushbutton) to TB3-4
Contact 2 (pushbutton) to TB3-3
TB3-4 to TB2-12
TB3-3 to TB2-11
TB2-12 to J1-P
TB2-11 to J1-N

If continuity does not exist in any of the above checks, tighten all connections. If continuity remains absent, notify Direct Support Maintenance.

Notify Direct Support Maintenance if trouble persists.

20. UNABLE TO STOP ENGINE WITH "ENGINE STOP" SWITCH

Notify Direct Support Maintenance if this condition exists.

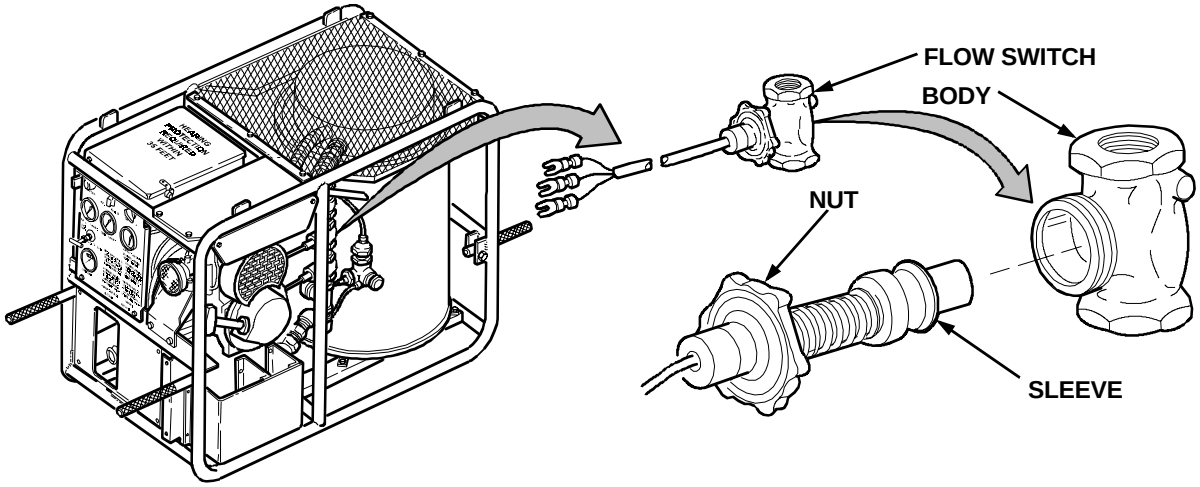
MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

21. BOTH JETS ON (Only one wand activated)

Disconnect nut from body of upper flow switch and inspect switch mechanism for broken spring, dirt and corrosion and freedom of movement.

Clean as necessary, using clear water.

Notify Direct Support Maintenance if trouble persists or if switch is defective.



22. NO OVERRIDE CAPABILITY (Low pressure override switch open)

Replace override switch (page 2-24).

2-7. UNIT MAINTENANCE TROUBLESHOOTING TABLE - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

23. ENGINE FAILS TO START OR STOPS - 215cc ENGINE

Step 1. Check if starter engages engine crankshaft and crankshaft can be turned. (Very little force will be required to pull starter rope if it fails to engage.)

If starter does not engage or free wheels, replace starter (page 2-47.2).

If starter engages and handle cannot be pulled, remove starter to isolate problem to starter or engine. Replace starter if internally bound up.

If engine crankshaft is locked, notify Direct Support maintenance.

Step 2. Check and inspect spark plug for cracks, dirt, burned electrodes and incorrect gapping. Gap should be 0.035 - 0.040 inch (0.89 - 1.0 mm).

If plug is cracked or burned, obtain replacement plug, gap as necessary and go to next step.

If plug appears dirty, but otherwise intact, clean with wiping rags (Item 17, App D), or abrasive paper (Item 13, App D), regap as necessary and go to next step.

WARNING

When checking spark plug for adequacy of spark be sure not to touch plug or cap with bare hand. Failure to heed this warning may result in injury from electric shock.

CAUTION

The spark plug must be grounded to engine. Never crank the engine over without having the spark plug attached to the high tension lead and grounded, as damage to the C.D.I. unit may result.

Step 3. Check for adequacy of spark by connecting spark plug cap to plug and pressing threaded portion of plug to a good ground while pulling starter handle. (Spark should be plainly visible and blue in color). Reinstall plug.

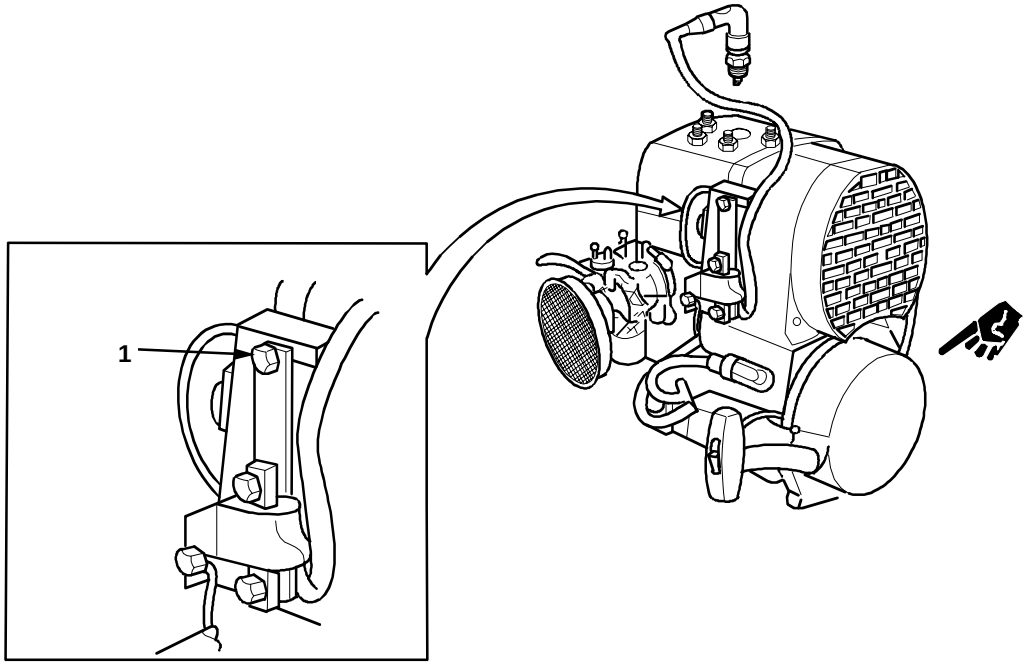
If the spark is adequate, proceed with step 7.

If the spark is weak or no spark is noted, check engine ignition ground for corrosion or looseness of fastener. Clean grounding terminal (1) with sandpaper or steel wool and ensure that grounding terminals are securely fastened to the engine block.

Check for adequacy of spark (Step 3). If no spark is noted proceed to next step.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

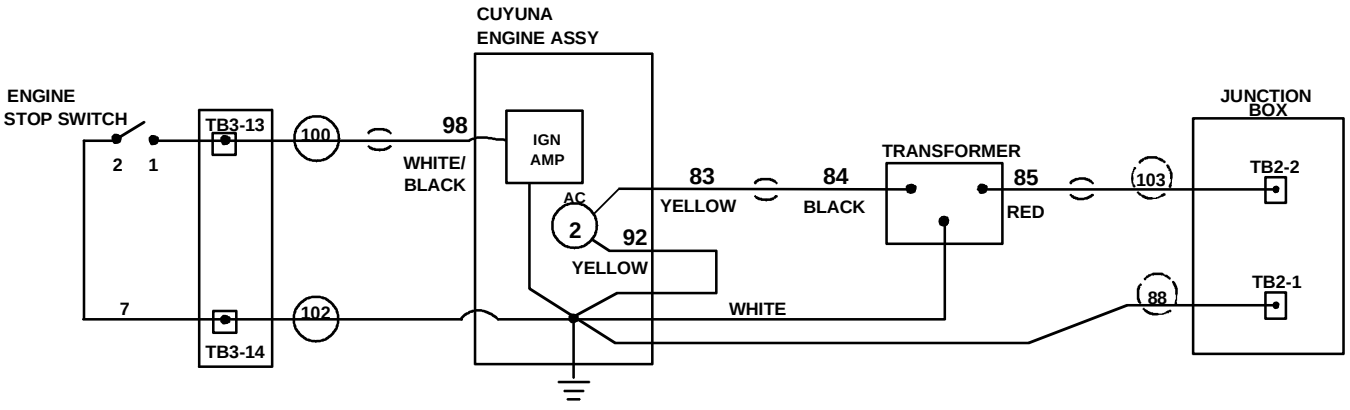
23. ENGINE FAILS TO START OR STOPS - 215cc ENGINE - Continued



Step 4. Detach white/black wire #98 from ignition amplifier at connector and check for adequacy of spark as per Step 3. Make sure white/black wire #98 is not grounded. Check for adequacy of spark by connecting spark plug cap to plug and pressing threaded portion of plug to a good ground while pulling starter handle. (Spark should be plainly visible and blue in color). Reinstall plug.

If spark is observed, either a stop switch wire is shorted or the engine stop switch is defective. Notify Direct Support maintenance.

If no spark is observed, proceed to Step 5 for Cuyuna engine serial number below 63247. If no spark is observed, proceed to step 5.2 for Cuyuna engine serial number 63247 or higher.



2-7. UNIT MAINTENANCE TROUBLESHOOTING TABLE - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

23. ENGINE FAILS TO START OR STOPS - 215cc ENGINE - Continued

Step 5. External ignition coil.

Using an ohmmeter (set to RX1 scale) test resistance in the primary windings of the coil. Attach the ohmmeter probes between the white/black wire #98 and black wire lead from the coil connector. The resistance reading should be between 0.25 and 0.35 ohms.

Replace coil (page 2-47.0) if resistance is not as specified.

If the resistance is within the range specified, go to Step 5.1.

Step 5.1 Charge/Trigger Coil Resistance Test (stator).

a. Test Charge/Trigger Coil Resistance (stator).

b. Set the ohmmeter scale selector on the R x 100 position and zero the meter.

c. Disconnect the black/red and red/white connectors from the amplifier unit.

d. Test between the red/white and black/red leads on wires leading into the engine magneto. The resistance must be between 146 and 175 ohms.

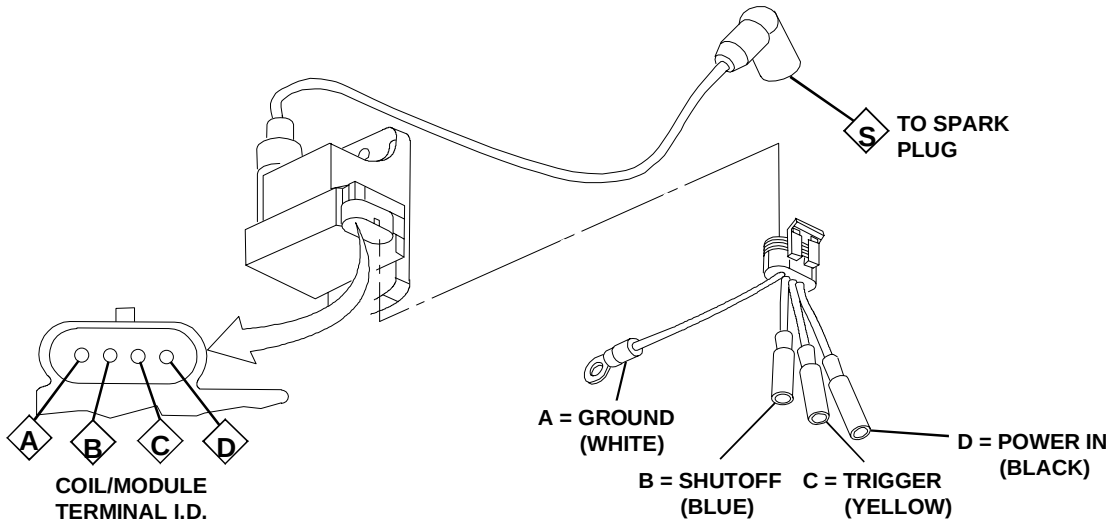
e. If the resistance is within the range specified for the charge/trigger coil, then the amplifier is defective. Replace the amplifier (page 2-47.0).

f. If the resistance is not within the range, replace the trigger coil (page 2-47.0).

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

23. ENGINE FAILS TO START OR STOPS - 215cc ENGINE - Continued

Step 5.2. Single CDM Ignition - - Coil / Module Test Procedures



IMPORTANT NOTICES ABOUT THIS TEST:
CAUTION: USE ONLY BATTERY POWERED DIGITAL METER – ANALOG METERS AND AC POWERED METERS MAY DAMAGE COIL / MODULE.
This test is **NOT** a conclusive test. Coil/module contains solid-state components and circuitry. Some internal defects **CANNOT** be detected using these test procedures. Thorough inspection and troubleshooting of basic electrical components, such as wiring, wiring connectors and terminals, spark plugs power sources, etc., **MUST** be performed and problems corrected prior to condemning coil/module. Final confirmation of a defective coil/module is to substitute a known good coil/module. If this corrects the problem, the assumption is that the original coil/module was defective.

Connect Positive (+) Meter Lead to:	Connect Negative (–) Meter Lead to:	Set Meter to Ohm Scale:	Test Value Specification:
A	C	R X 100	1250 ± 100 Ohms (Ω)
D	A	R X 100 Diode Reading*	Continuity (at or near Zero Ohms)
A	D	R X 100 Diode Reading*	No Continuity ∞ (Infinite Resistance)
D	B	R X 100 Diode Reading*	No Continuity ∞ (Infinite Resistance)
B	D	R X 100 Diode Reading*	Continuity (at or near Zero Ohms)
S	A	R X 100	1000 ± 300 Ohms (Ω)
A	B	R X 100	No Continuity ∞ (Infinite Resistance)
B	A	R X 100	Continuity (at or near Zero Ohms)

***Diode Reading Test Setting:**
Due to differences in test meters, results other than specified may be obtained. In such cases, reverse meter leads and retest. Diode measurements will be opposite for "Fluke" meters and equivalent.

If spark is not observed, perform Step 5.3.

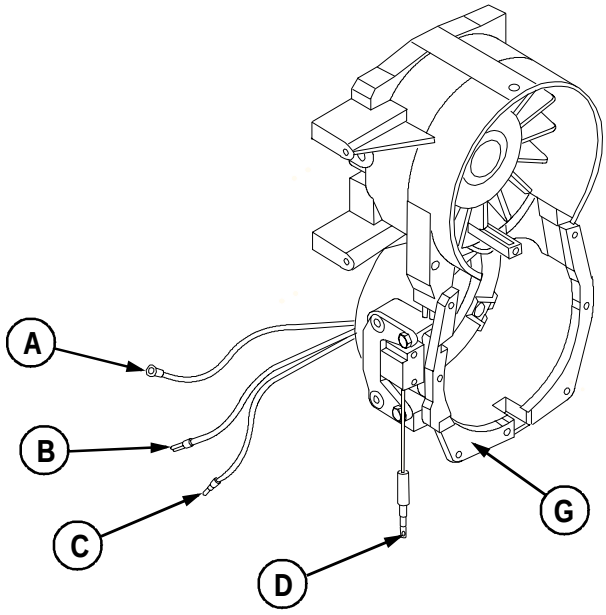
2-7. UNIT MAINTENANCE TROUBLESHOOTING TABLE - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

23. ENGINE FAILS TO START OR STOPS - 215cc ENGINE - Continued

Step 5.3. Single CDM Ignition - - Stator and Trigger Tests

- **A** = Stator Charging, Yellow with Eyelet Connector
- **B** = Stator Charging, Yellow with Female Insulated Spade Connector
- **C** = Stator Ignition Power, Black with Male Bullet Connector
- **D** = Trigger Wire, Yellow with Male Bullet Connector
- **G** = Engine Ground



NOTE
Disconnect all wiring connections before conducting tests:

IGNITION TRIGGER RESISTANCE TEST			
Connect Positive (+) Meter Lead to:	**Connect Negative (–) Meter Lead to**	**Set Meter to Ohm Scale:**	**Test Value Specification:**
Ⓓ	Ⓖ	R X 1	8.6 ± 0.4 Ohms (Ω)
Ⓖ	Ⓓ	R X 1	8.6 ± 0.4 Ohms (Ω)

STATOR CHARGING COILS RESISTANCE TEST			
Connect Positive (+) Meter Lead to:	**Connect Negative (–) Meter Lead to**	**Set Meter to Ohm Scale:**	**Test Value Specification:**
Ⓐ	Ⓑ	R X 1	≤ 0.6 Ohms (Ω)
Ⓑ	Ⓐ	R X 1	≤ 0.6 Ohms (Ω)
Ⓐ	Ⓖ	R X 1	No Continuity ∞
Ⓖ	Ⓐ	R X 1	No Continuity ∞

STATOR IGNITION POWER COILS RESISTANCE TEST			
Connect Positive (+) Meter Lead to:	**Connect Negative (–) Meter Lead to**	**Set Meter to Ohm Scale:**	**Test Value Specification:**
Ⓒ	Ⓖ	R X 1	175.0 ± 10.0 Ohms (Ω)
Ⓖ	Ⓒ	R X 1	175.0 ± 10.0 Ohms (Ω)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

23. ENGINE FAILS TO START OR STOPS - 215cc ENGINE - Continued

Step 6. Check for defective/clogged fuel system by disconnecting the fuel line at the carburetor and operating the ball pump. Fuel should flow freely from the open hose. Be sure to direct fuel into container and keep away from sparks and electrical circuits.

If fuel is adequate, service and adjust the carburetor (page 2-48 and 2-51).

Step 7. Check for fuel at fuel filter inlet.

Step 8. Replace carburetor (page 2-53). If the malfunction persists, notify Direct Support Maintenance.

24. ENGINE RUNS ROUGHLY OR LACKS POWER/SPEED - 215cc ENGINE

Step 1. Check spark plug for physical damage or fouling.

If the spark plug is damaged or fouled, replace spark plug.

Ensure plug gap is 0.035 to 0.040 in. (0.89 to 1.0 mm) prior to installation.

Step 2. Check that spark plug tip is firmly attached to spark plug body.

Step 3. Check engine rpm.

If speed is not between 4200 and 4400 rpms under load, adjust speed setting disk (governor) (page 2-52).

Step 4. Set throttle on carburetor to maximum speed and push lever at speed setting disk toward engine and then release. Lever should snap back quickly and without binding.

If lever snaps back without binding, go to step 6; if not, continue with step 5.

Step 5. Remove carburetor (page 2-53) and repeat step 4.

If lever does not snap back, repair carburetor (page 2-54), checking for broken spring, improper assembly, other damaged or worn parts.

After repairs have been completed, perform engine speed adjustment procedures (page 2-52).

Step 6. Check engine ignition system malfunction 23, steps 4 through 8.

Step 7. Check engine fuel system malfunction 23, steps 6 through 8.

Step 8. Check for cracked, broken or pinched fuel pump hose (page 2-37).

Step 9. Check for defective fuel pump.

Prime the carburetor using the ball pump and carburetor tickler. Remove the fuel line leading to the carburetor inlet and direct the flow into the suitable container (approximately 1 pint). Have an assistant start the engine and observe fuel flow from the fuel line. If little or no fuel is observed, the fuel pump is defective and must be replaced.

2-7. UNIT MAINTENANCE TROUBLESHOOTING TABLE - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

25. ENGINE OVERHEATS - 215cc ENGINE

Step 1. Check for loose or broken fan belt.

Adjust or replace fan belt (page 2-47.4).

Notify Direct Support Maintenance if trouble persists.

26. EXCESSIVE NOISE AND VIBRATION - 215cc ENGINE

Step 1. Inspect engine mounts for broken or missing hardware.

Tighten, replace, and adjust mounting hardware.

Step 2. Check for loose muffler mounting bolts.

Tighten nuts.

Replace muffler (page 2-46.2), if trouble persists.

Section IV. UNIT MAINTENANCE PROCEDURES

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2-8. GENERAL

a. The maintenance procedures in this manual are to be performed by personnel with MOS of 63J, Quartermaster and Chemical Equipment Repairer.

b. The maintenance procedures in this section are to be performed by a Unit Maintenance technician or by the user under Unit Maintenance supervision.

WARNING

Cleaning solvent is toxic and flammable. Use only in well-ventilated area. Avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts, and avoid skin contact.

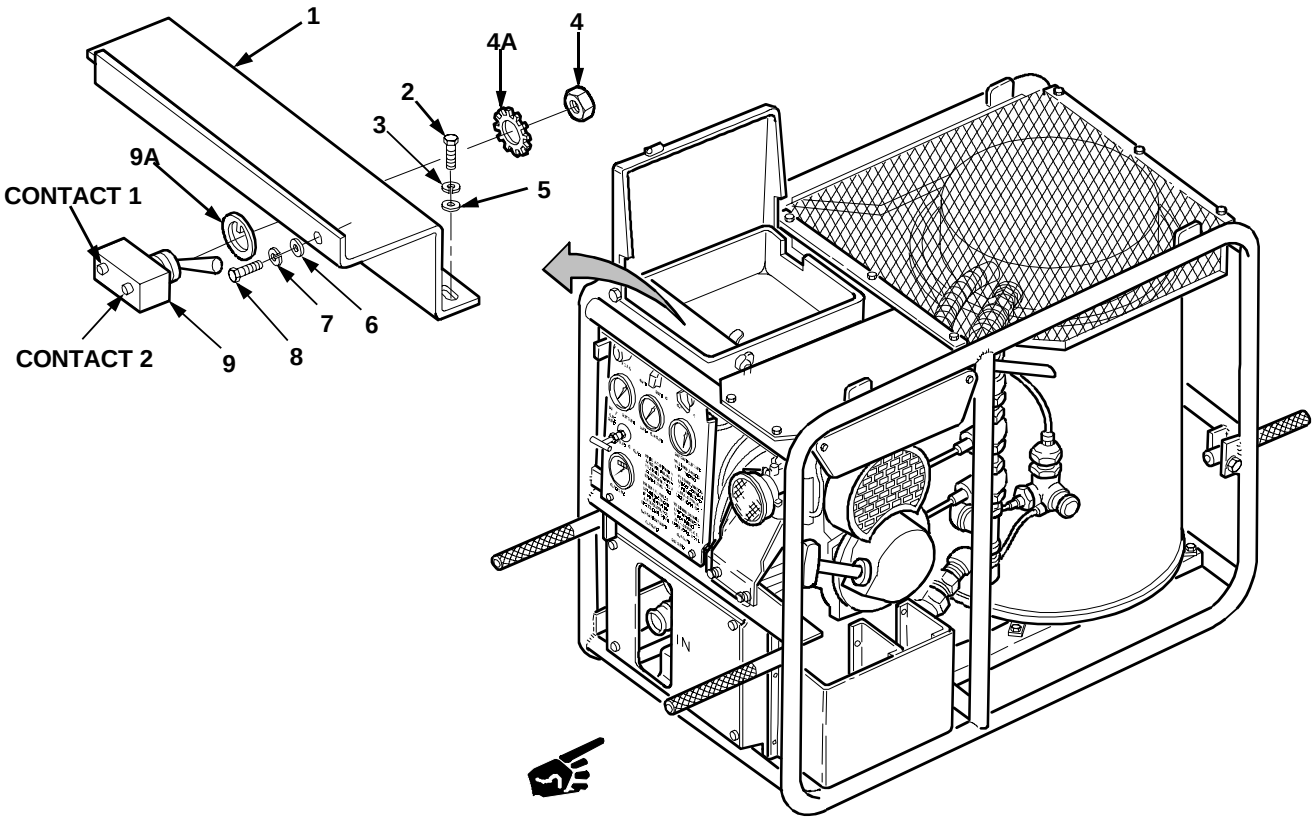
(c) Tag wires and unsolder from switch (9), using soldering iron.

(d) Remove nut (4), lockwasher (4A), switch (9), and tabwasher (9A).

(e) Install replacement switch on guard and connect wires to terminals as indicated, or as tagged, using soldering iron and solder.

SWITCH CONTACT	TO
1	Wire 39 (TB3-9)
2	Wire 40 (TB3-10)

(f) Reinstall switch guard (1) with screws (2 and 8), washers (5 and 6), and lockwashers (3 and 7).



2-9. PUMP/HEATER ASSEMBLY MAINTENANCE - Continued

(2) Replacement of Fuel Pump Belt

(a) Remove drive side panel (10) (page 2-32) to gain access to belt.

(b) Push down on right side of pump assembly, using nipple (15) as lever to release pressure on belt as the pump pivots on its mounting bolt.

(c) Remove belt (11).

(d) Install replacement belt (11).

(e) Reinstall panel (10).

(3) Replacement of Water Pump Belts

NOTE

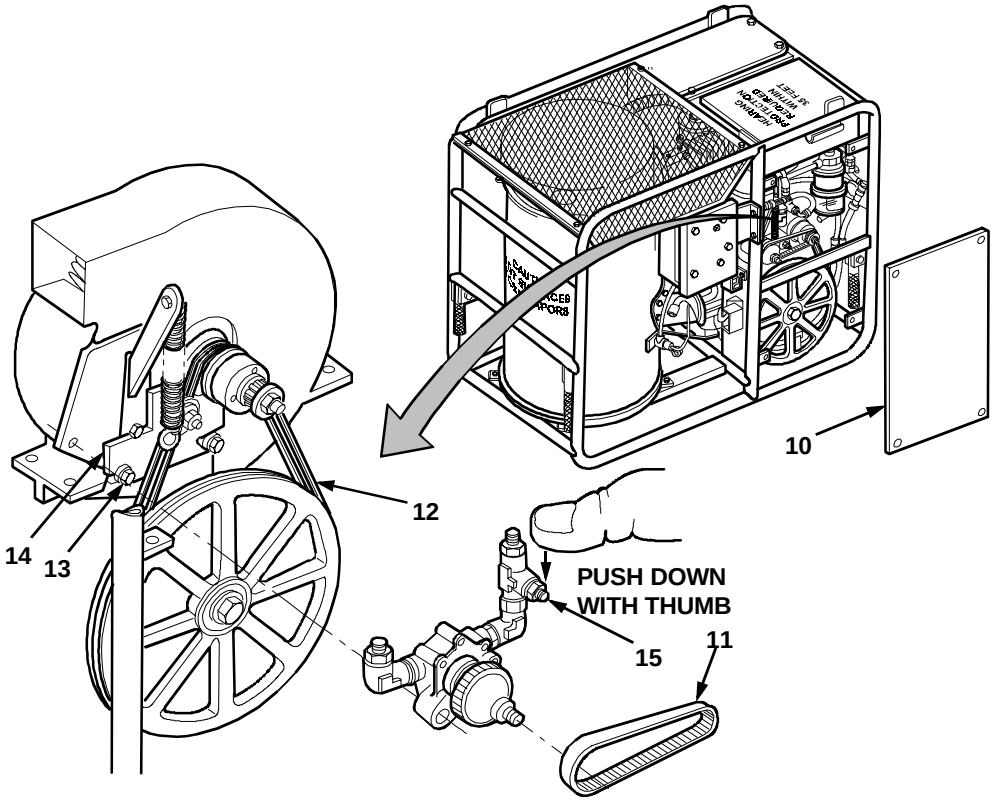
Always replace both belts, even if only one is worn or damaged.

(a) Remove drive side panel (10) for access (page 2-32).

(b) Remove fuel pump belt (as above).

(c) Loosen two screws (13) and slide tensioner assembly (14) to the left to release belt tension.

(d) Remove water pump belts (12).



(e) Install two replacement belts on engine drive assembly and water pump pulley.

(f) Reinstall fuel pump belt (page 2-26).

(h) Perform belt adjustment procedure (2-31).

(4) Replacement of Voltage Tripler and High Voltage Cable

WARNING

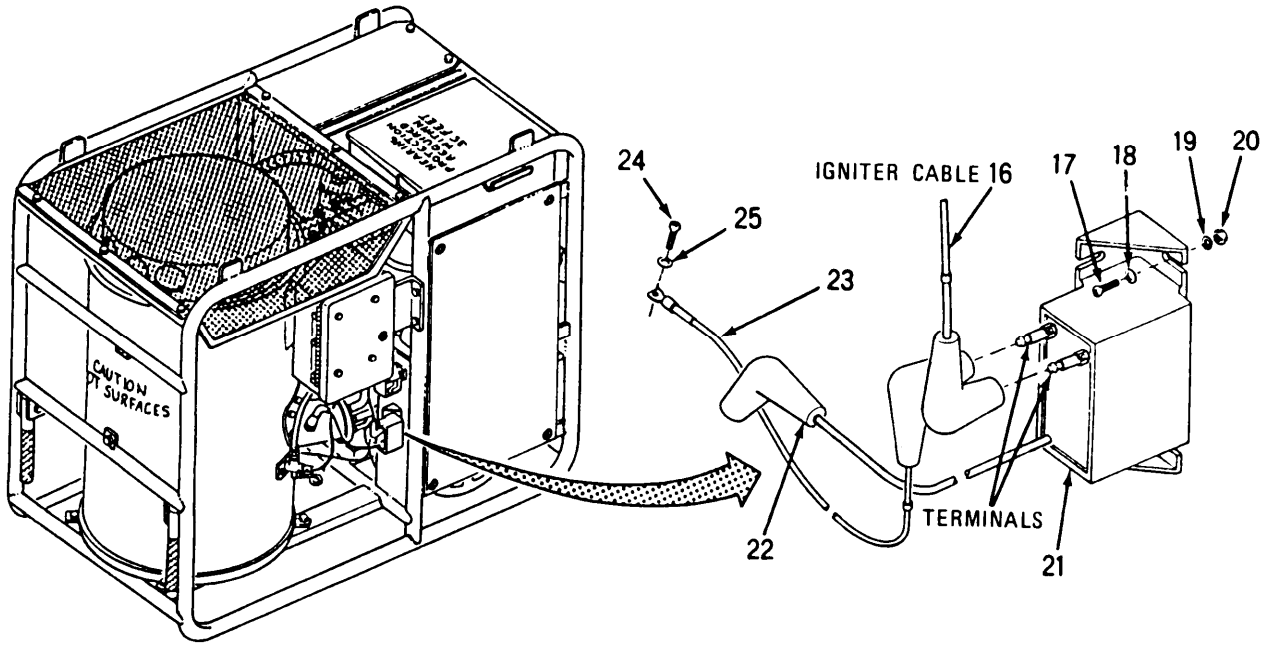
Voltage tripler may contain dangerously high voltage even when unit is not operating Do not touch tripler or associated wires with bare hands unless tripler has been discharged.

(a) Using a screwdriver with insulated plastic handle, discharge voltage tripler, by touching, at the same time, both terminals on voltage tripler.

(b) Disconnect output cable (22) from igniter plug

(c) Disconnect igniter cable (16) at voltage tripler (21).

(d) Disconnect grounding cable (23) from voltage tripler (21).



(e) Remove two nuts (20), screws (17), washers (18 and 19) and voltage tripler (21).

(f) Remove screw (24), washer (25) and grounding cable (23).

2-9. PUMP/HEATER ASSEMBLY MAINTENANCE - Continued

(4) Replacement of Voltage Tripler and High Voltage Cable - Continued

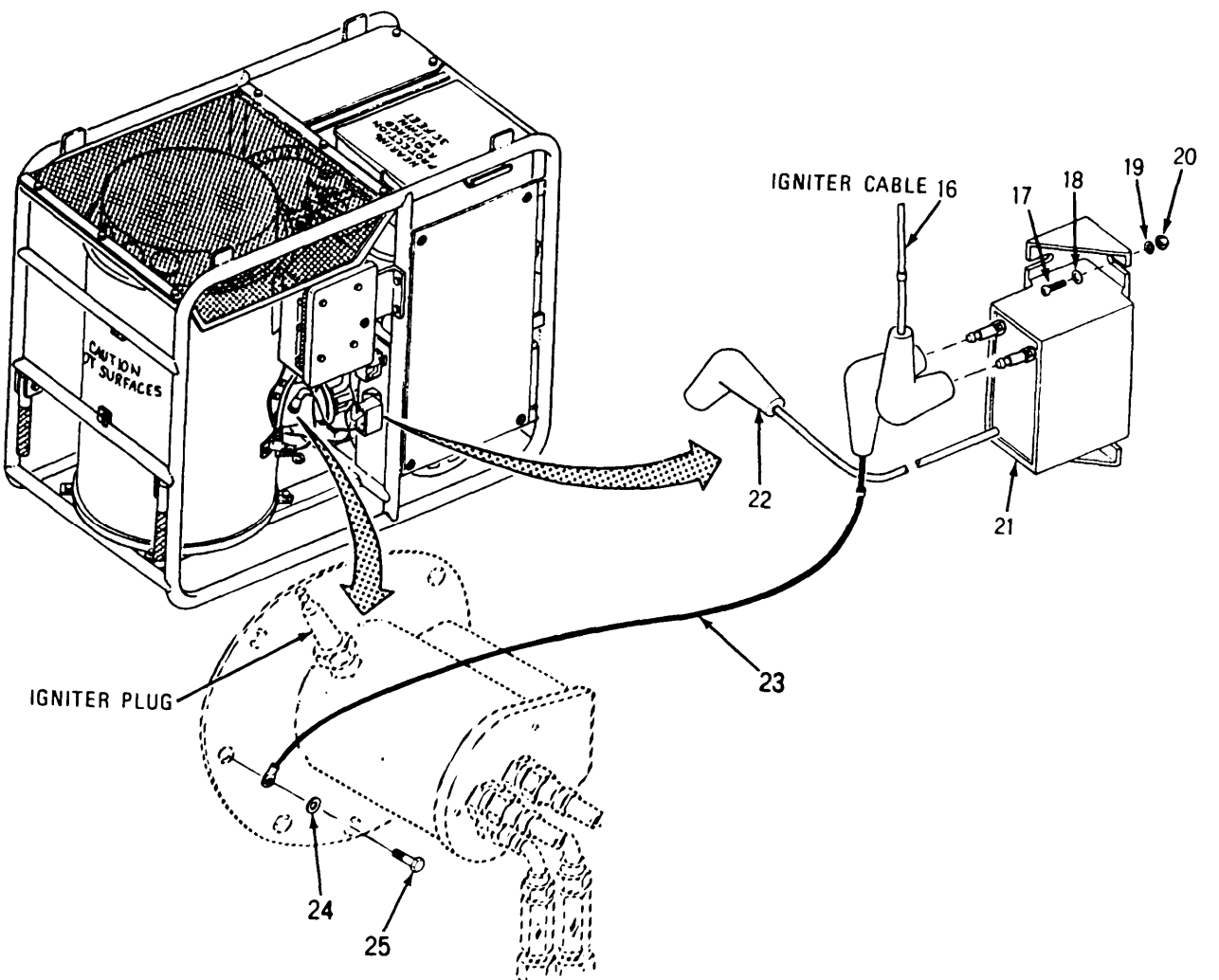
(g) Clean voltage tripler mounting surface using cleaning solvent and brush.

(h) Position replacement voltage tripler (21) on frame and secure with two screws (17), washers (18 and 19) and nuts (20).

(i) Connect cable (16) (output from igniter assembly) to voltage tripler.

(j) Attach grounding cable (23) to burner assembly flange with screw (25) and washer (24) and connect other end to voltage tripler as indicated.

(k) Reconnect output cable (22) to igniter plug.

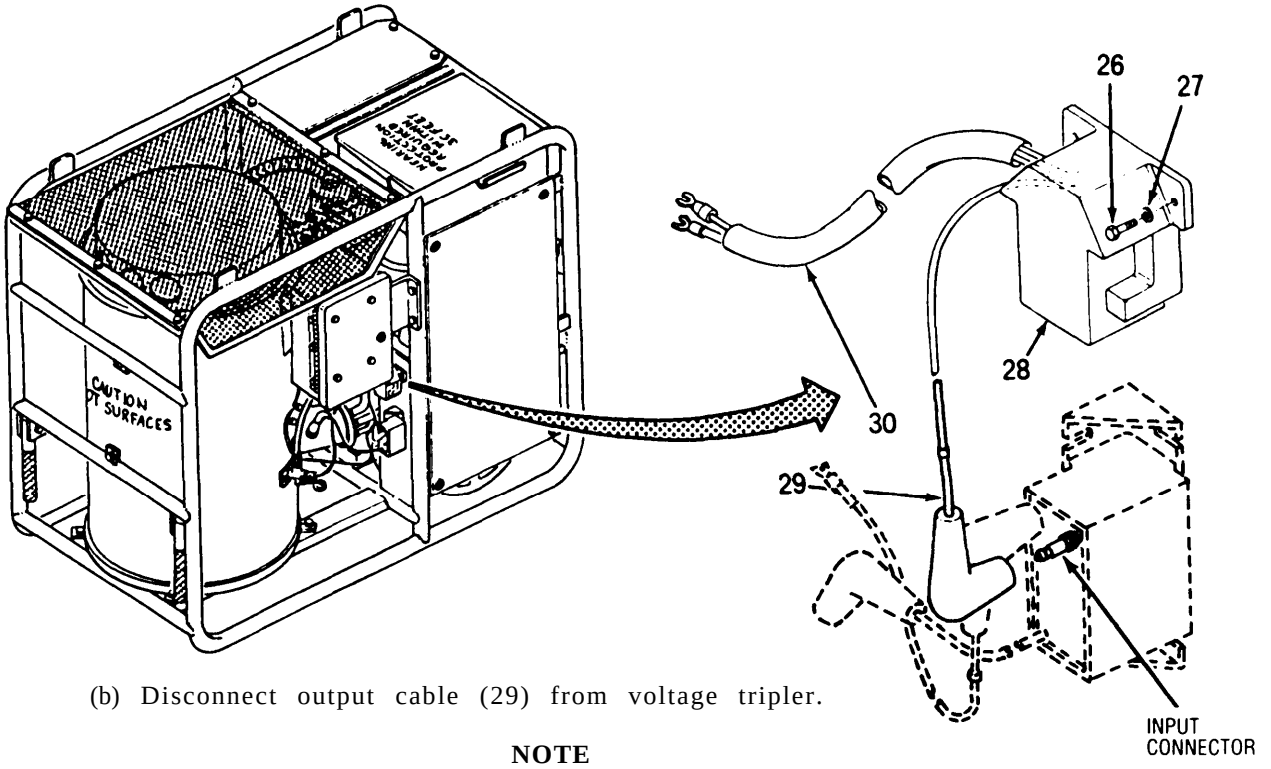


(5) Replacement of Igniter Assembly

NOTE

Refer to System Schematic and Wiring Diagram (page F-1) as necessary.

(a) Disconnect igniter cable (30) (wires 4 and 6) from terminal boards, TB2-1 and TB2-3 injunction box assembly.



(b) Disconnect output cable (29) from voltage tripler.

NOTE

Loosening of obstructing fuel hose may be necessary.

(c) Remove two bolts (26) two washers (27) and igniter assembly (28). Removal of tiedown straps may be necessary.

(d) Clean igniter assembly mounting surfaces with cleaning solvent and brush.

(e) Position replacement igniter assembly (28) on frame and secure with two bolts (26) and washers (27).

(f) Route input cable (30) to terminal boards in junction box and connect wire 6 to TB2-3 and wire 4 to TB2-1.

(g) Connect green output cable (29) to input connector on voltage tripler.

(h) Install tiedown straps as necessary.

(i) Retighten all fuel line connections

2-9. PUMP HEATER/ASSEMBLY MAINTENANCE - Continued

(6) Replacement of .Mica Window

NOTE

When removing hardware, support mica window and spacer to keep them from falling.

(a) Remove two bolts (31), washers (32) and lockwashers (37).

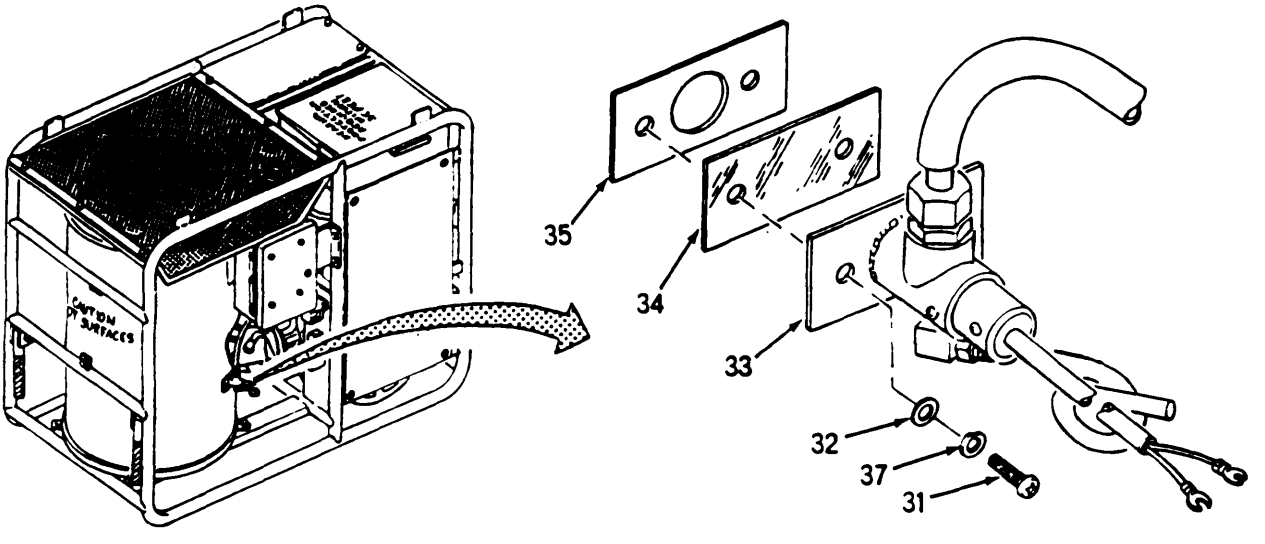
(b) Pull photocell and tee assembly (33) away from heat exchanger and remove mica window (34) and spacer (35).

(c) Clean mica window, using rags and inspect for cracks. Discard if cracked.

(d) Using a clean rag, clean carbon deposits from "eye" of the photocell in the photocell and tee assembly (33).

(e) Position replacement mica window (34) between spacer (35) and photocell and tee assembly (33).

(f) Install with two washers (32), lockwashers (37) and screws (31).



c. Adjustment of Water Pump Belts

(1) Remove drive side panel (10) (page 2-32).

(2) Loosen water pump belt tensioner attaching bolts (41). Move tensioner (38) as far left as possible.

(3) Move water pump belt tensioner (40) to the right until roller (38) just touches belts (12).

(4) Move tensioner (38) an additional 1/4 inch to the right and securely tighten bolts (41).

(5) Start engine and operate unit for approximately 30 minutes.

(6) Shut unit down and carefully reach in and touch fan hub (36). (This hub is the drive pulley for the water pump.) If hub surface is hot to touch, belts (12) need additional tightening. Tighten as follows:

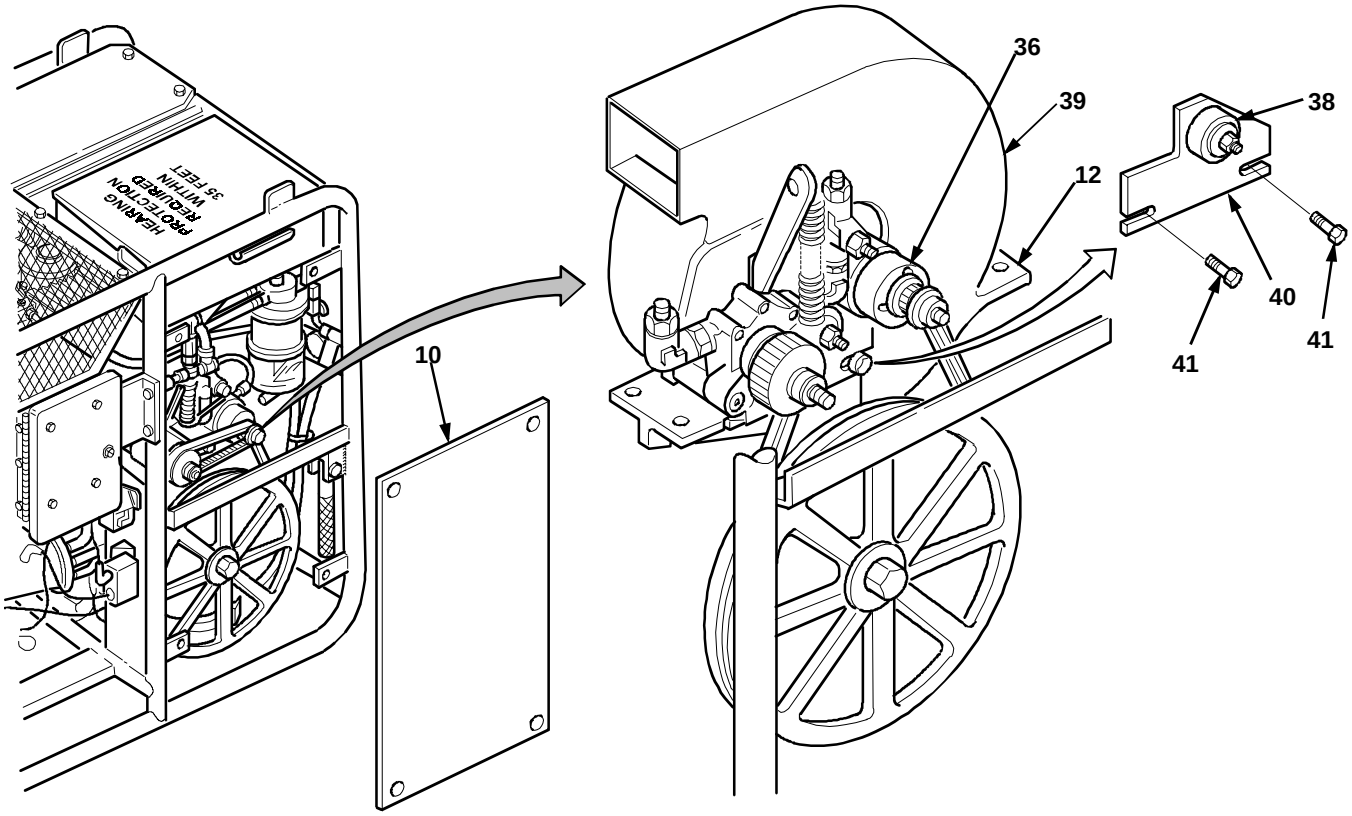
(a) Using a screwdriver or other suitable available tool, scribe position of left end of tensioner (38) on fan housing (39).

(b) Slightly loosen two attaching bolts (13), but do not remove.

(c) Push tensioner (40) 3/16 to 1/4 inch farther to the right and, while holding in place, securely tighten attaching bolts (41).

(d) Repeat steps (5) and (6) to verify adjustment.

(7) Reinstall panel (10).



2-10. DRIVE SIDE PANEL MAINTENANCE

This task consists of:
a. Replace
(1) Removal
(2) Installation
b. Repair (Replacement of Fasteners)

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-90-N26)
Pliers, Special (Item 3, Figure C-61)
Tool, Camloc Fasteners (Item 2, Figure C-61)

Materials Required:
Cleaning Solvent (Item 21, App D)
Brush, Varnish (Item 4, App D)

Equipment Conditions:
Engine shut down and cold

a. Replace

(1) Removal

(a) Using a medium tip screwdriver, engage stud assembly (3) screwdriver slots and turn CCW until they disengage.

(b) Remove drive side panel (4).

(2) Installation

(a) Place drive side panel in position on pump/heater assembly.

(b) Engage screwdriver slots of stud assemblies (3) and turn CW until they snap in place.

b. Repair (Replacement of Fasteners)

(1) Using special pliers, grasp stud assembly (3) with fork of pliers below stud shoulder and compress spring of stud assembly with pliers. Remove stud assembly.

(2) Insert a screwdriver in split of split ring (1) and remove ring with a twist of the screwdriver.

(3) Remove grommet (2).

(4) Clean stud mounting hole, using cleaning solvent and brush and allow to dry.

(5) Insert grommet (2) through stud mounting hole and secure with split ring (1) as follows:

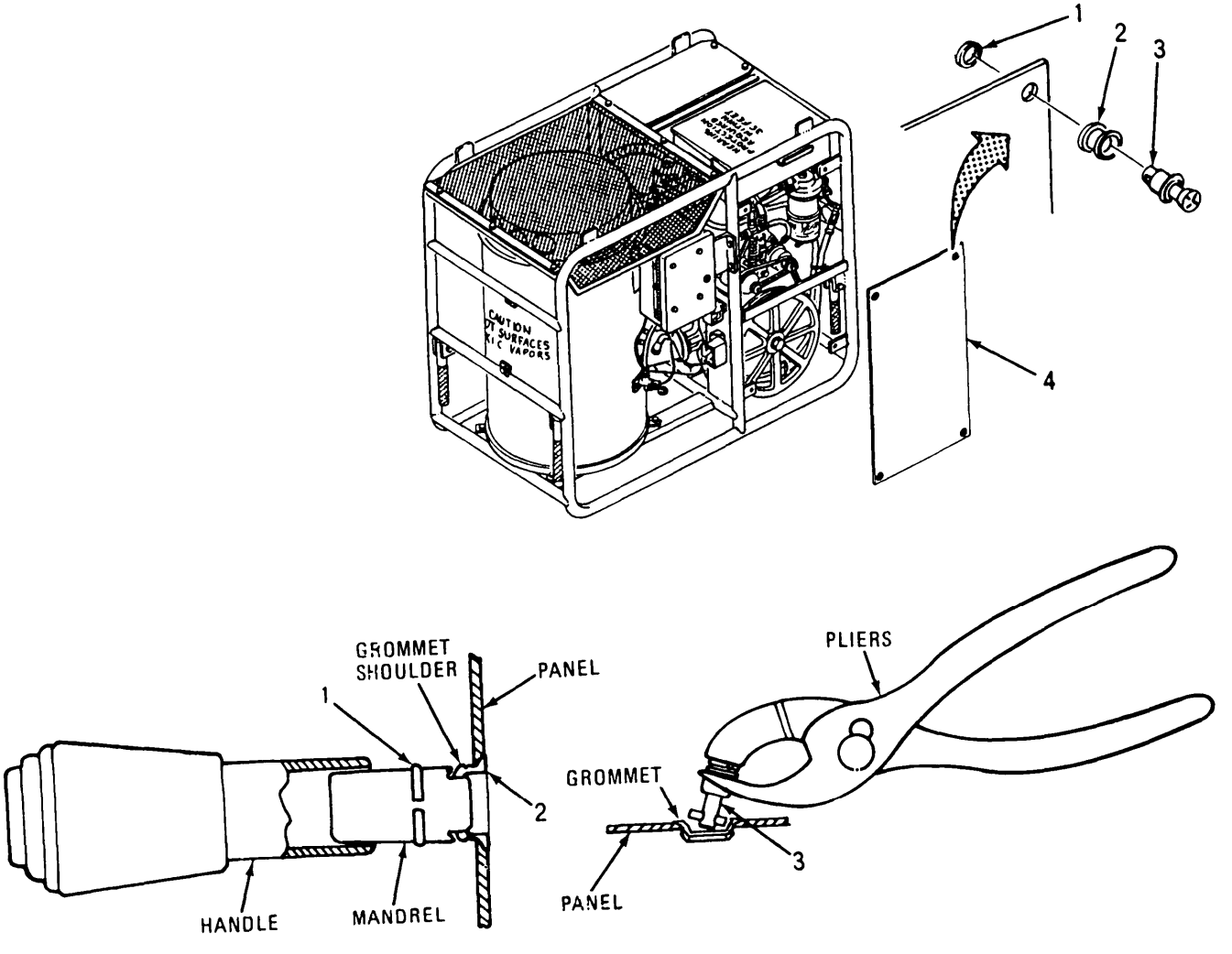
(a) Position split ring on narrow end of mandrel (part of camloc fastener).

(b) Position larger end of mandrel inside of grommet.

(c) Place handle over mandrel and push against panel until ring snaps in place.

(6) Grasp replacement stud assembly (3) with fork of pliers below shoulder of stud assembly and squeeze handles to compress stud assembly spring.

(7) Insert stud assembly through grommet (2) and release pliers.



2-11. BURNER FUEL PUMP MAINTENANCE

This task consists of: **a. Replace**
(1) Removal
(2) Installation
b. Repair

INITIAL SET-UP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-90-N26)

Materials Required:
Cleaning Solvent (Item 21, Appendix D)
Brush (Item 4, Appendix D)
Locking Compound (Item 6, Appendix D)

Equipment Conditions:
Engine shut down and cold

a. Replace

(1) Removal

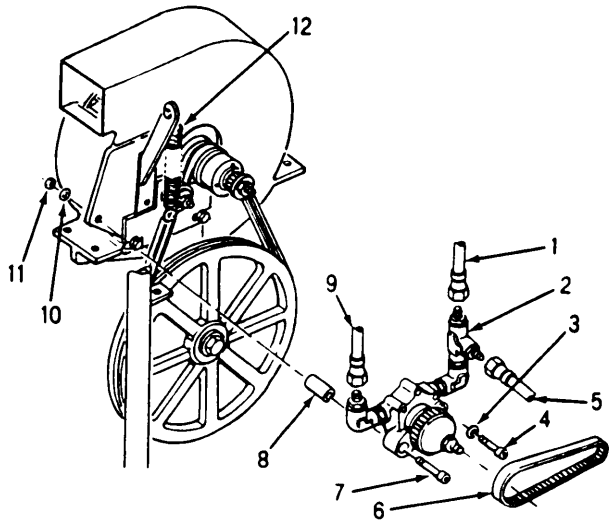
(a) Remove drive side panel (page 2-32).

(b) Remove fuel pump belt (6) (page 2-26).

(c) Disconnect spring (12) from fuel pump by loosening sockethead screw (4).

(d) Disconnect hose assemblies (1, 5 and 9) from fuel pump assembly.

(e Remove nut (11), sockethead screw (7), spacer (8), washer (10) and fuel pump assembly (2).



(2) Installation

(a) Place replacement fuel pump assembly (2) and spacer (8) in position and secure with sockethead screw (7), nut (11) and washer (10).

NOTE

Sockethead screw (7) must be loose enough so that pump (19) can pivot.

(b) Connect hoses (1, 5, and 9).

(c) Attach spring (12) to sockethead screw (4) on fuel pump assembly, behind washer (3) and tighten screw.

(d) Position belt (6) on pulleys and reinstall panel (page 2-32).

b. Repair

Repair consists of replacement of elbows, nipples and tee. If pump (19) is defective, replace entire assembly.

NOTE

Use locking compound on all threads except hose connections.

(1) Remove nipples (13, 15 and 22).

(2) Remove tee (14) and nipple (16).

(3) Remove elbows (17 and 21).

(4) Remove nipples (18 and 20).

(5) Clean all components with cleaning solvent and brush.

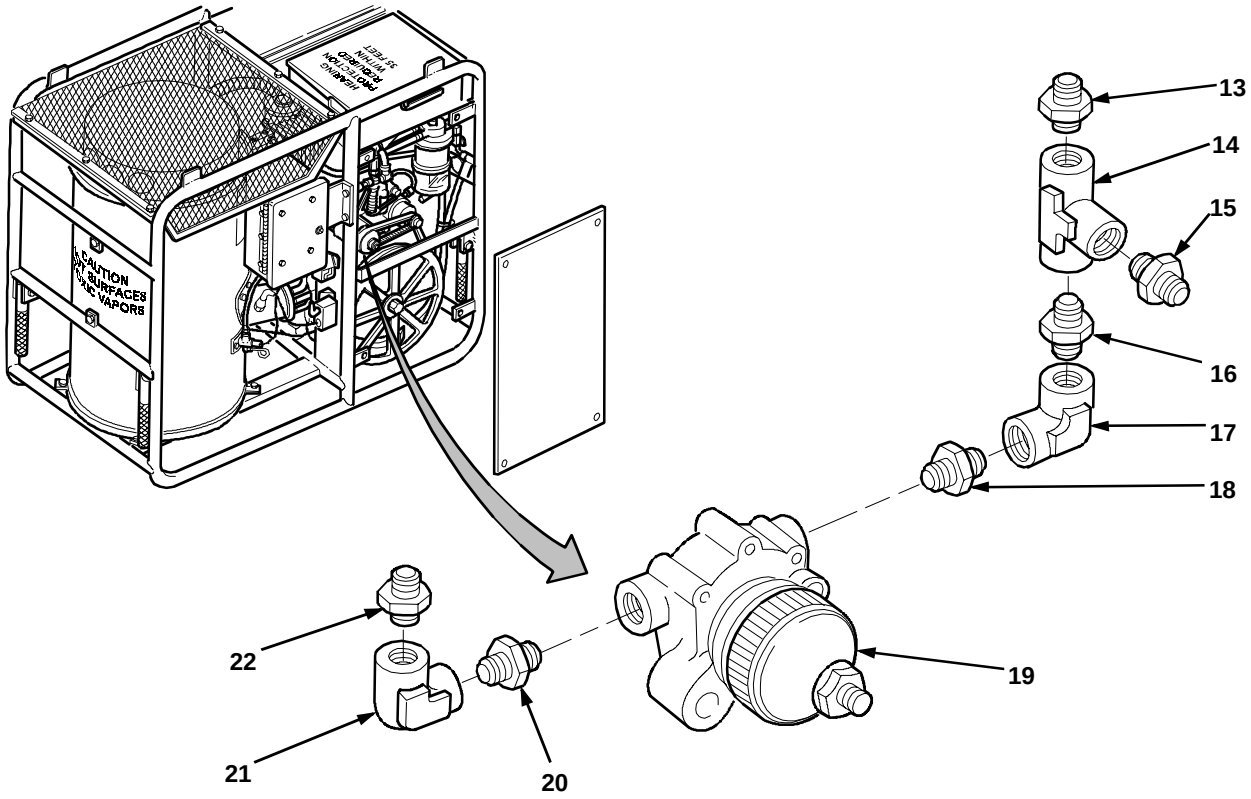
(6) Install nipples (18 and 20).

(7) Install elbows (17 and 21).

(8) Install nipples (16 and 22).

(9) Install tee (14).

(10) Install nipples (13 and 15).



2-12. ENGINE FUEL SYSTEM MAINTENANCE

This task consists of: **Repair**
a. Disassembly
b. Assembly

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)

Materials Required:
Bulk Hose (MIL-H-13444, Type 1)
Bulk Hose (MIL-H-5593-3)
Tags (Item 25, App D)
Tiedown Straps (Item 23, App D)

Equipment Conditions:
Engine shut down and cold

a. Disassembly

NOTE

Removal of drain plate may be necessary for access (page 2-44).

(1) Cut tiedown straps (2) and remove strainer (1).

(2) Remove hose (3).

(3) Remove gasket (4).

(4) Cut tiedown strap (6) and remove fuel tag (7).

(5) Remove ball pump assembly (8) from lid assembly (5) and filter (9).

(6) Remove nut (11), bolt (14), washers (12) and clamp (13); then remove filter (9) and hose (10).

(7) Remove adapter (15) and hose (16).

(8) Remove hoses (17 and 18).

b. Assembly

(1) Install tag (7) on ball pump hose with tiedown strap (6).

(2) As required, cut length of hose needed from bulk hose to fabricate hoses (3, 10, 16, 17 and 18). Alternate ball pump has furnished plastic compression clamps to secure ball pump to hoses.

(3) Install hose (16) on fuel pump and insert adapter (15) in open end of hose.

(4) Connect fuel hose (18) to carburetor inlet port and fuel pump outlet port (barbed nipple at top of fuel pump); and air hose (17) to fuel pump port (smooth surface nipple at top of fuel pump) and nipple on engine block.

(5) Connect hose (10) to adapter (15) and secure with clamp (13), bolt (14), washers (12) and nut (11).

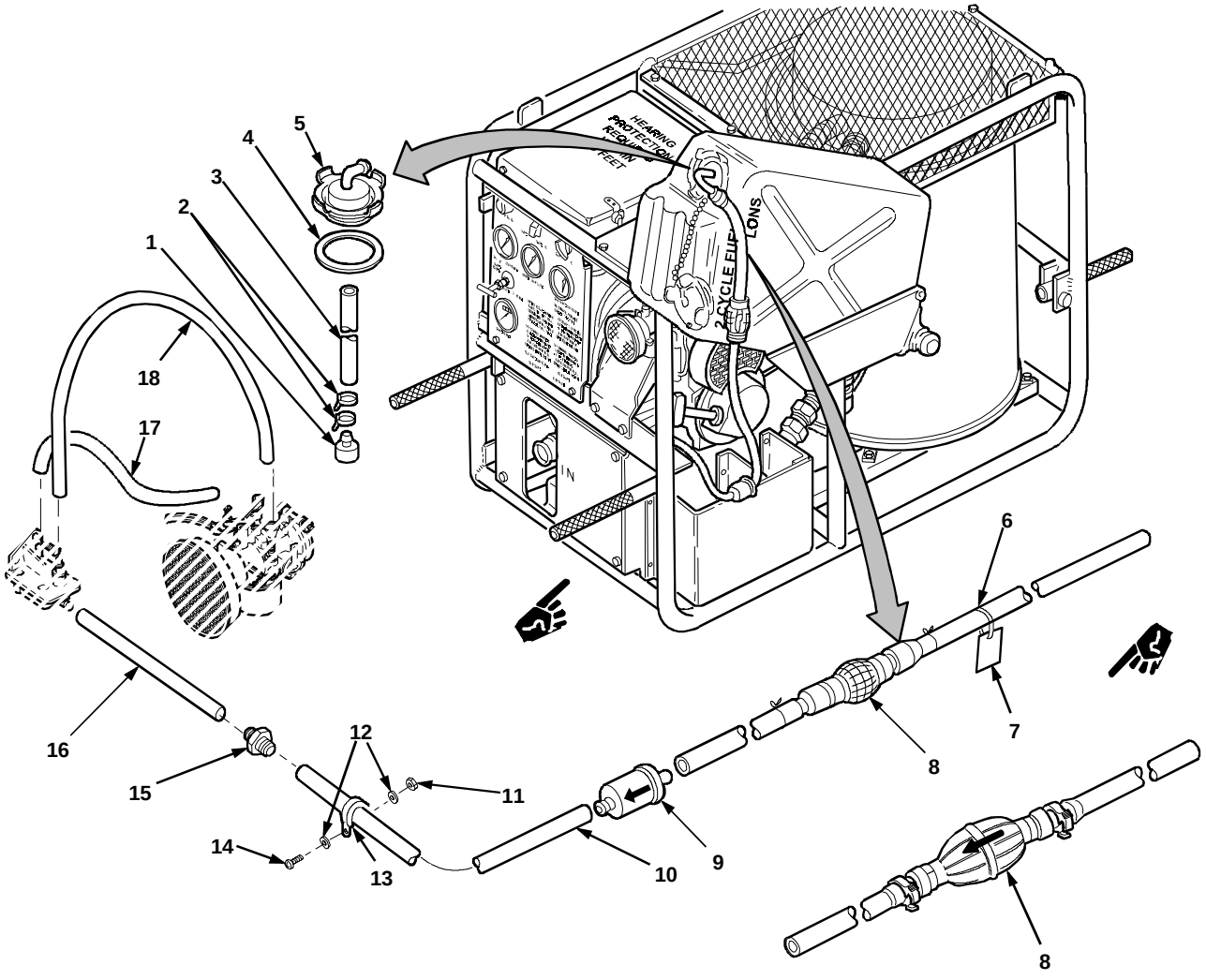
NOTE

Ensure filter and ball pump flow arrows point in direction of fuel flow.

(6) Insert filter (9) in end of tube (10), making sure arrow points in direction of fuel flow, and connect other end to ball pump assembly (8). Connect other free end of ball pump assembly (8) to lid assembly (5).

(7) Install hose (3) and gasket (4) on lid assembly (5).

(8) Install strainer (1) on open end of hose (3) with two tiedown straps (2).



2-13. BURNER FUEL PUMP TENSIONER ASSEMBLY MAINTENANCE

This task consists of: **Repair**
a. Disassembly and Removal
b. Assembly and Installation

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)

Materials Required:
Brush, Varnish (Item 4, App D)
Cleaning Solvent (Item 21, App D)

Equipment Conditions:
Engine shut down and cold

Repair

a. Disassembly and Removal

(1) Remove drive side panel (page 2-32) and fuel pump belt (page 2-26).

(2) Loosen screw (7) and washer (6), attaching spring (5) to fuel pump assembly and disconnect spring (5).

(3) Remove screw (1), nut (4), washer (3) and spring (5) from bracket (2).

(4) Remove two sockethead screws (8), washers (10), lockwashers (9) and bracket (2) from fan housing.

(5) Clean all parts and mating surfaces with cleaning solvent and brush and inspect. Discard unserviceable items.

b. Assembly and Installation

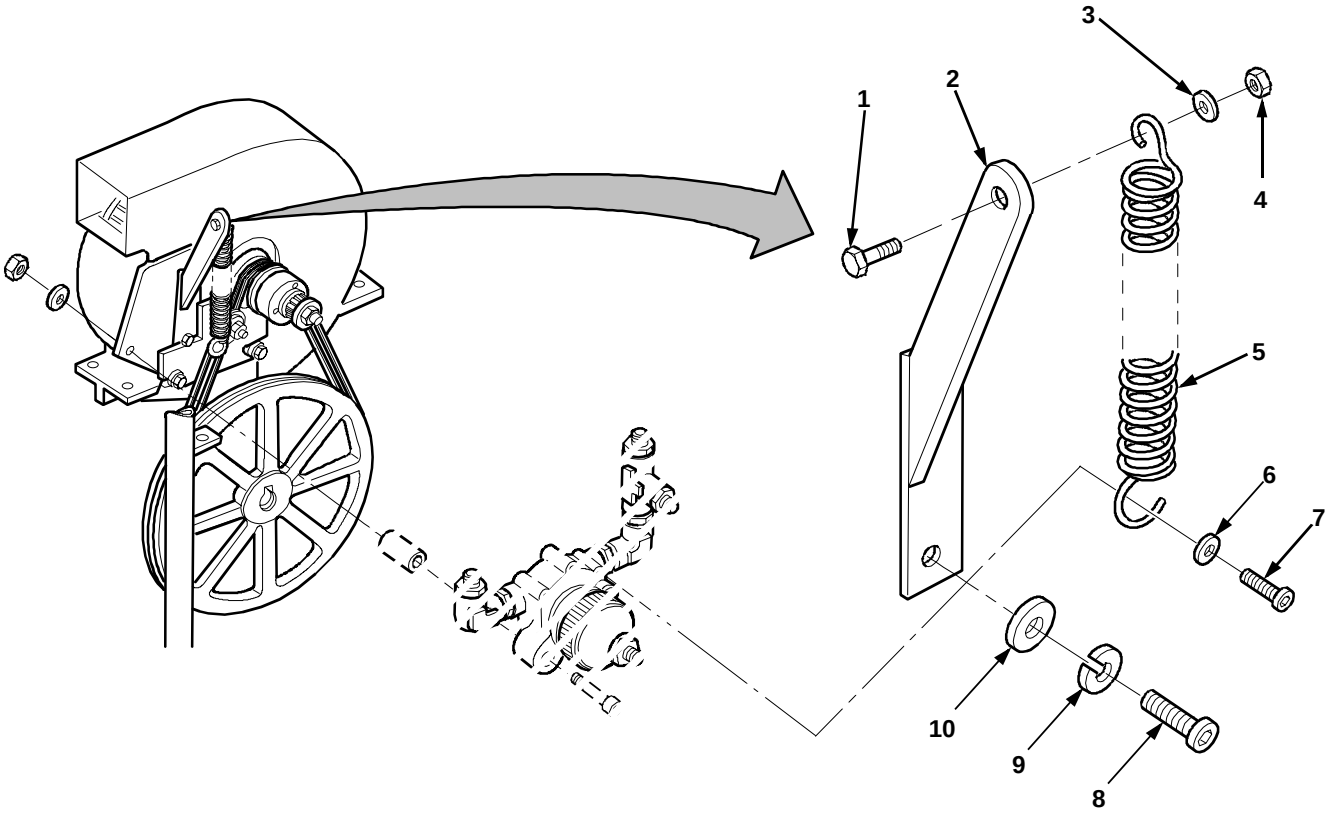
(1) Secure bracket (2) to fan housing with two sockethead screws (8), washers (10) and lockwashers (9).

(2) Attach spring (5) to bracket with screw (1), washer (3) and nut (4).

(3) Secure spring (5) to fuel pump assembly with screw (7) and washer (6).

(4) Reinstall fuel pump belt (page 2-26).

(5) Reinstall drive side panel (page 2-32).


1
2
3
4
5
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10

2-14. ENGINE AND FAN ASSEMBLY MAINTENANCE

This task consists of: **Inspect**
Repair (Transformer Replacement)
a. Removal
b. Cleaning
c. Replacement

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)

Materials Required:
Cleaning Solvent (Item 21, App D)
Plastic Tie Wraps (Item 23, App D)

Equipment Conditions:
Engine shut down and cold

Inspect

Inspection of engine and fan assembly is limited to inspection of engine mounting bolts, general engine/fan assembly condition, exhaust hose and ground wire connections.

a. Inspect exhaust hose (3) for cracks and deterioration. Check to see if bolt (2) and nut (1) are in place and tight.

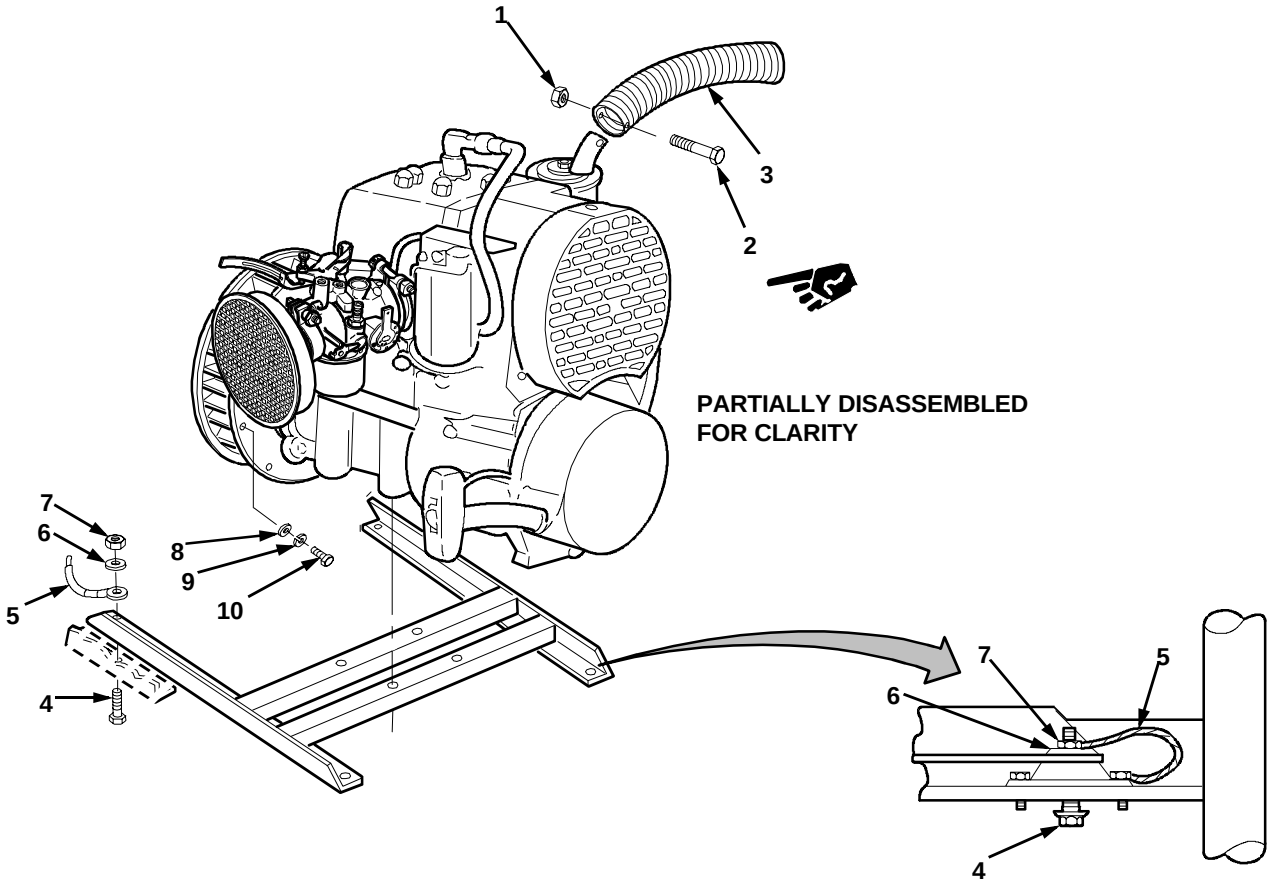
b. Check if ground wire (5) is in place (one position only) and four nuts (7), washers (6) and bolts (4) are in place and properly installed. Bolts should protrude about 3/16 inch at the bottom (as shown) and nut (7) should be tight.

c. If nut (7) is loose or bolt (4) is improperly installed, loosen nut (7), screw bolt (4) in or out until the 3/16 inch clearance is obtained and tighten nut while holding bolt with a second wrench to keep it from turning.

d. Check to see that eight bolts (10), washers (8) and lockwashers (9) are present and tight.

e. Check to see that bolts securing mounts to frame are not cracked or deteriorated.

f. Start engine and listen for fan noises. Unusual noises from fan may indicate fan damage or sheared key. Notify Direct Support Maintenance if this problem exists.



NOTE

Bolt (4) protrudes approximately 3/16 inch at bottom when properly installed.

2-14. ENGINE AND FAN ASSEMBLY MAINTENANCE - Continued

Repair (Transformer Replacement)

a. Removal

(1) Remove four screws (7), lock washers (6), washers (5) and inlet side cover (4).

(2) Detach black transformer wire #84 from yellow engine wire #83 at connector.

(3) Detach red transformer wire #85 from wire #103 at connector.

(4) Detach white transformer ground wire from engine block by unscrewing screw. Remove cap screw, washer, and electrical connector.

(5) Cut any plastic ties holding transformer wires in place.

(6) Remove four screws (1) and self locking nuts (3) holding the transformer (2) to back of the inlet side cover (4).

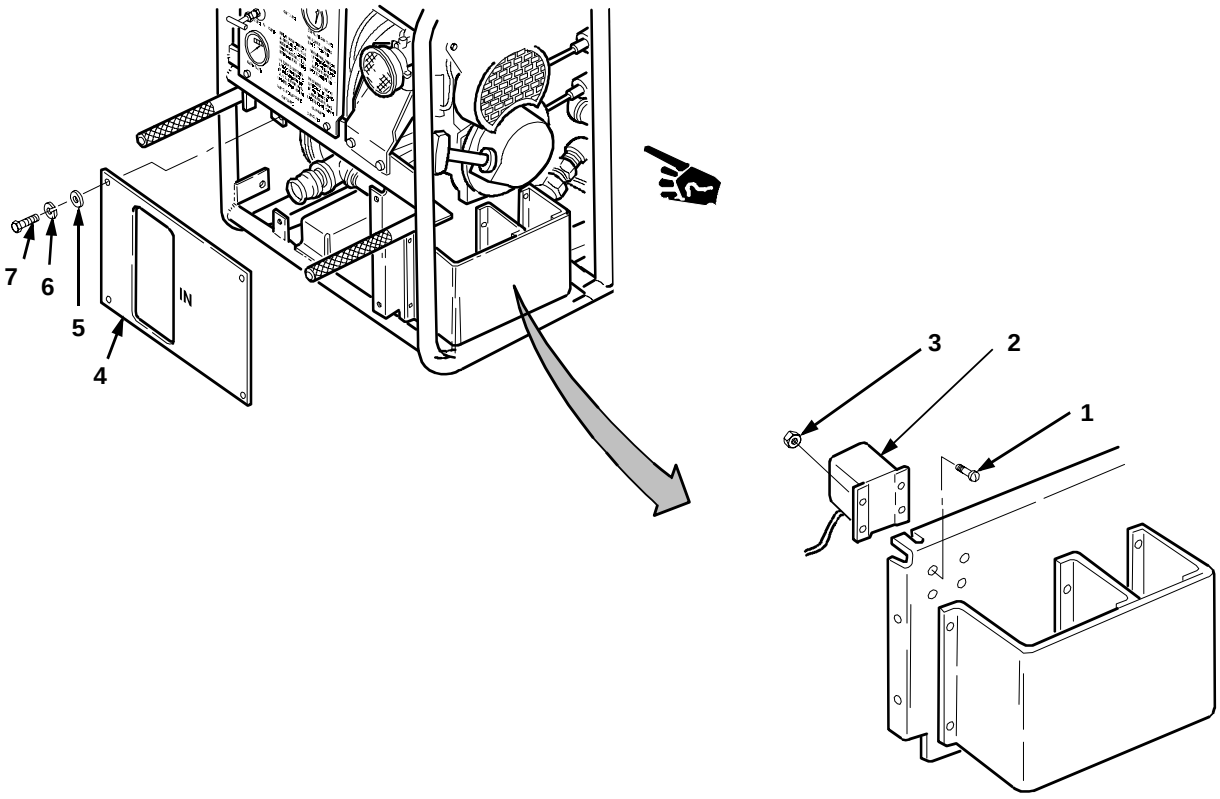
b. Cleaning

Clean mounting surface on inlet side cover.

c. Replacement

(1) Install transformer (2) on back of inlet side cover (4) using four screws (1) and self locking nuts (3).

(2) Attach transformer white ground wire to engine block with screw and washer.



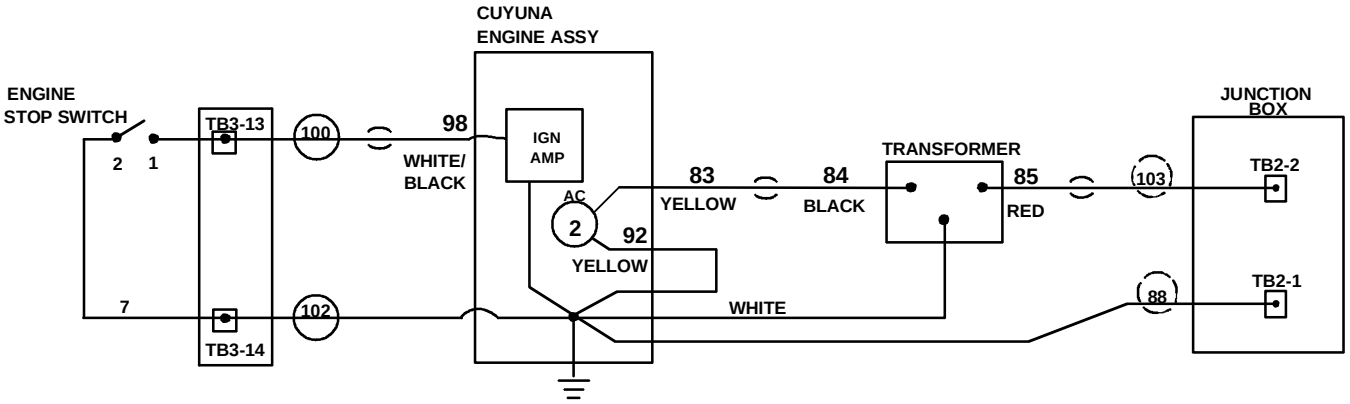
(3) Attach ground wires to transformer.

(4) Attach red transformer wire #85 to TB-2 wire #103 at connector.

(5) Attach black transformer wire #84 to yellow engine wire #83 at connector.

(6) Secure transformer wires with plastic ties as necessary.

(7) Replace inlet side cover (4) with washers (5), lockwashers (6), and four screws (7).



2-15. ENGINE ASSEMBLY MAINTENANCE

This task consists of:

a. Service
(1) Torquing Cylinder Head Nuts
(2) Cleaning/Inspection of Spark Plug and Spark Plug Cap
b. Repair
(1) Replacement of Fuel Pump
(2) Replacement of Spark Plug
(3) Deleted
(4) Replacement of Cylinder Head and Head Gasket
(5) Replacement of Muffler

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)
Shop Equipment, Automotive Org. #1, Common (SC 4910-95-A74)

Materials Required:
Cleaning Solvent (Item 21, App D)
Wiping Rags (Item 17, App D)
Gasket (Item 5, Page C-33-1)
Brush, Varnish (Item 4, App D)

Equipment Conditions:
Engine shut down and cold

a. Service

Engine servicing shall consist of periodic check/tightening of cylinder head nuts and cleaning and inspection of spark plug. Frequency of service is covered in PMCS.

(1) Torquing cylinder head nuts:

(a) Make sure engine is cold.

(b) Remove three screws (0.1) and access cover (0.2).

(c) Torque cylinder head nuts (3) to 16-18 lb ft in sequence as indicated.

(d) Recheck torque, following the same sequence.

(2) Cleaning/inspection of spark plug and spark plug cap:

(a) Disconnect spark plug cap (1) from plug (2).

(b) Using a spark plug or socket wrench, remove plug (2).

(c) Clean plug with cleaning solvent and rags.

(d) Inspect plug for burned electrodes and cracks. Replace if burned or cracked.

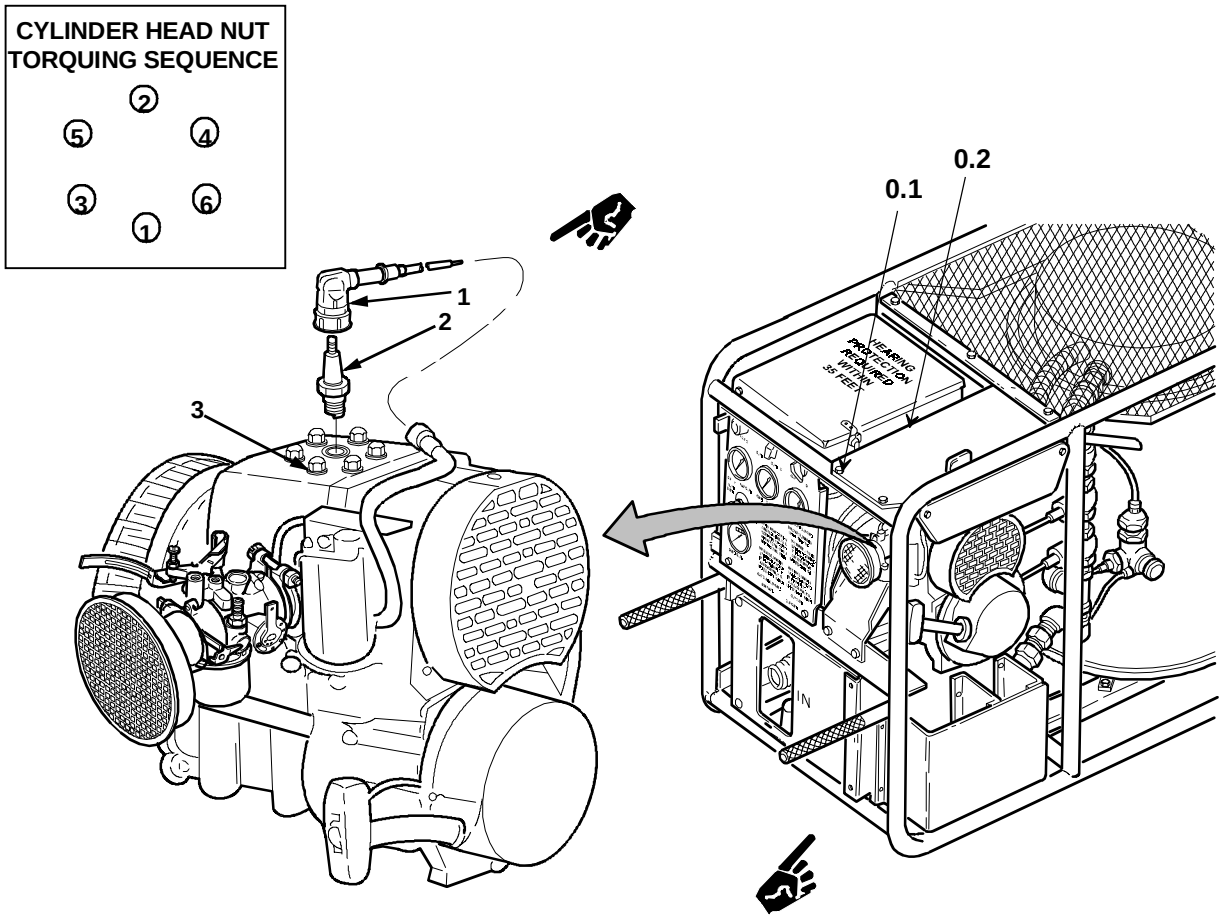
(e) Using a feeler gage, check for proper gap between electrodes. Required gap is 0.035 to 0.040 inch for the 215cc engine. If the gap is too small, regap by bending outer electrode. If gap is too large, tap on lower electrode to reduce gap.

NOTE

Verify that spark plug tip is fingertight to spark plug body.

(f) Install plug (2) and reconnect plug cap (1).

(g) Reinstall access cover (0.2) and three screws (0.1).



2-15. ENGINE ASSEMBLY MAINTENANCE - Continued

b. Repair

(1) Replacement of Fuel Pump

(a) Remove two bolts (13), lockwashers (12), washers (11), and drain plate (10).

(b) Disconnect air (5) and fuel hoses (6 and 8) from fuel pump (9).

(c) Remove two screws (7) and remove fuel pump (9) and shim (4).

(d) Position shim (4) and replacement fuel pump on fan housing spacer and secure with two screws (7).

(e) Reconnect fuel and air hoses as indicated. Air hose goes to smooth surface nipple on top of fuel pump, carburetor supply hose goes to barbed nipple, and fuel supply hose from fuel can goes to bottom nipple on fuel pump.

(f) Reinstall drain plate (10) with two bolts (13), lockwashers (12), and washers (11).

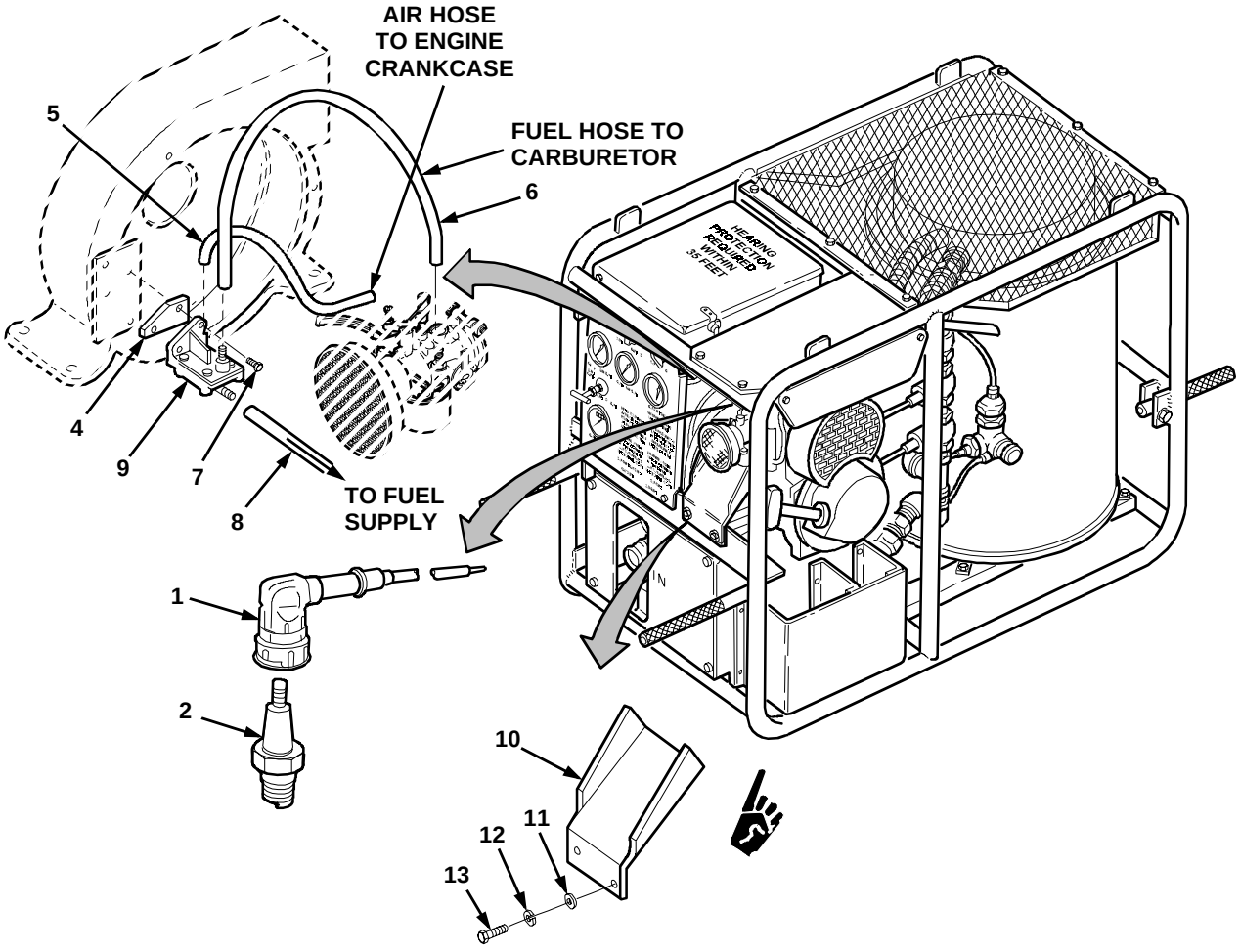
(2) Replacement of Spark Plug

(a) Disconnect plug cap (1) from spark plug (2).

(b) Remove plug (2).

(c) Check/gap replacement plug for 0.035 to 0.040 inch gap (215cc engine) and install.

(d) Reconnect cap (1) on spark plug.


AIR HOSE
TO ENGINE
CRANKCASE
FUEL HOSE TO
CARBURETOR
5
6
4
9
7
8
TO FUEL
SUPPLY
1
2
10
11
12
13
HEARING
PROTECTION
REQUIRED
WITHIN
35 FEET

2-15. ENGINE ASSEMBLY MAINTENANCE - Continued

b. Repair - Continued

(3) Deleted.

(4) Replacement of cylinder head and head gasket

(a) Disconnect cap (1) from spark plug.

(b) Remove spark plug (2).

(c) Remove six nuts (3) and washers (16).

(d) Mark position of head in relation to cylinder to ease installation.

CAUTION

A slight tap with a mallet may be necessary to loosen the head. Be careful not to damage fins.

(e) Prior to removing the cylinder head (17), inscribe a mark to note which side is facing carburetor.

(f) Remove cylinder head gasket (18).

(g) Remove as much carbon as possible by scraping with a putty knife and using cleaning solvent, clean mating surfaces of cylinder and cylinder head and wipe off with rags.

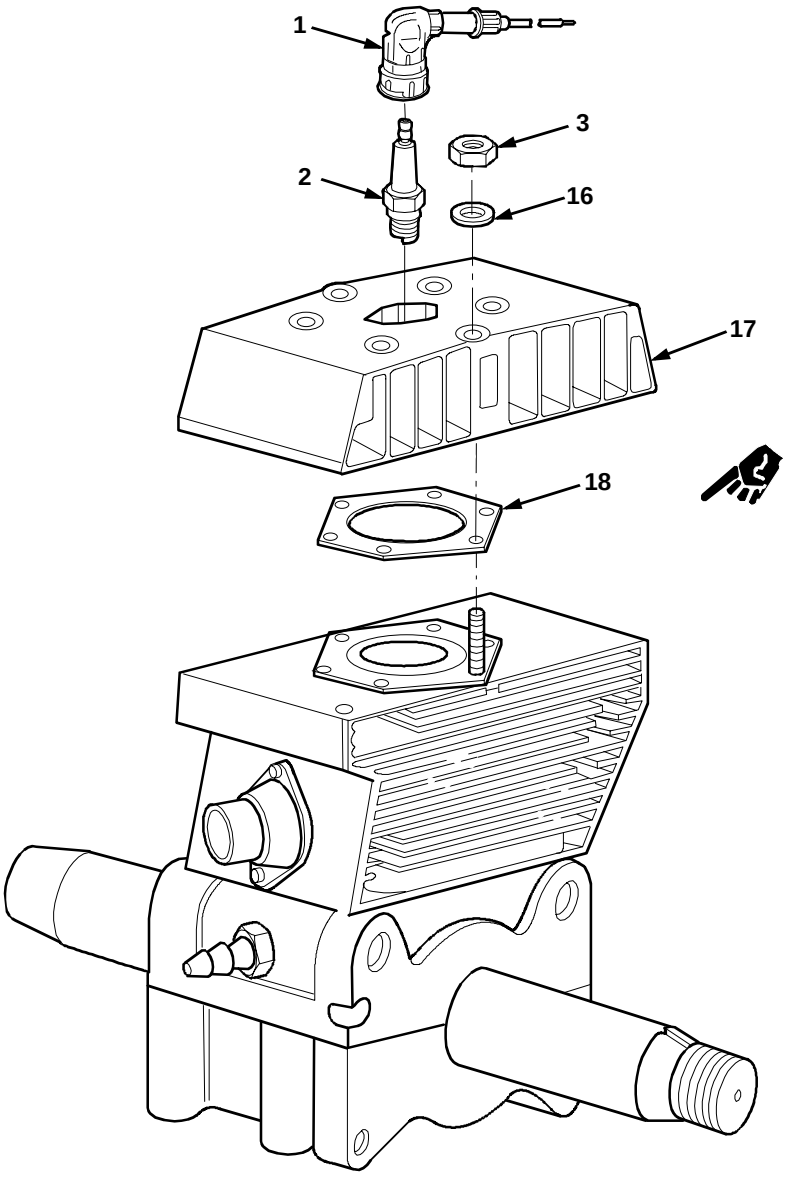
(h) Place replacement gasket (18) on cylinder.

(i) Reinstall head (17) as marked with six nuts (3) and washers (16), fingertight until snug.

(j) Using torque wrench, cross torque nuts (3) to 16-18 ft lb, in sequence described on page 2-43.

(k) Deleted.

(l) Reinstall spark plug (2) and connect cap (1).



2-15. ENGINE ASSEMBLY MAINTENANCE - Continued

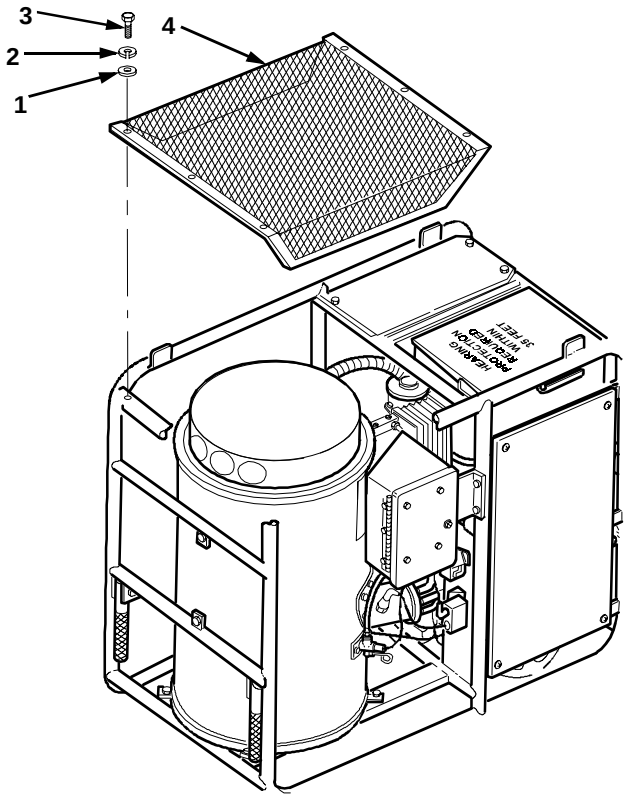
b. Repair - Continued

(5) Replacement of muffler.

NOTE

Muffler is removed and installed with engine in place on the system.

(a) Remove bolts (3), washers (1), lockwashers (2) and guard assembly (4).



(b) Remove bolt (12), washers (9 and 11) and nut (8).

(c) Remove two nuts (7) and lockwashers (6).

(d) Slide flexible hose (10) as far onto heat exchanger as possible and remove muffler (13).

(e) Remove gasket (5).

WARNING

Cleaning solvent is toxic and flammable. Use only in well ventilated area. Avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts, and avoid skin contact.

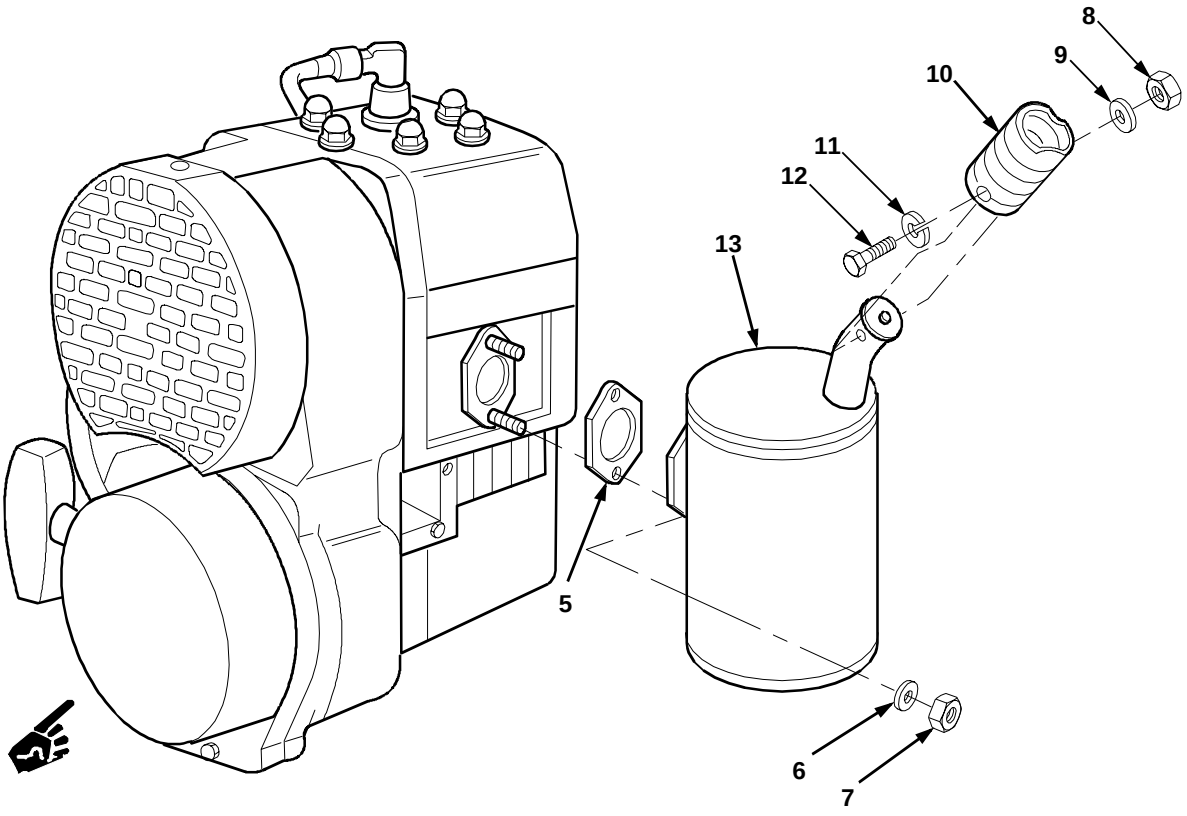
(f) Clean muffler mounting surfaces on engine with cleaning solvent and brush and inspect all parts for serviceability.

(g) Position new gasket (5) on muffler mounting studs.

(h) Install replacement muffler (13) with two nuts (7) and lockwashers (6), making sure flexible hose (10) is engaged with muffler (13) and heat exchanger.

(i) Secure hose(10) to muffler (13) with bolt (12), washers (9 and 11), and nut (8).

(j) Reinstall guard (4) with bolts (3), washers (1), lockwashers (2), and guard assembly (4).



2-15.1 ENGINE IGNITION SYSTEM MAINTENANCE – 215 cc ENGINE

This task consists of: **Repair (Ignition System, Replacement of Ignition Coil and Ignition Amplifier)**
a. Removal
b. Inspection
c. Assembly

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)

Materials Required:
Brush (Item 4, App D)
Cleaning Solvent (Item 21, App D)

Equipment Conditions:
Engine shut down and cold

Repair

a. Removal

(1) Unplug spark plug cap (1) from spark plug by pulling on the cap while rotating slightly. Do not pull on wire to remove cap.

(2) Detach primary blue/white and black/white leads of ignition coil (2).

(3) Unscrew screw (4) and remove along with washer (5).

(4) Unscrew screw (6) and remove along with washer (7). Remove ignition coil (2) from engine.

(5) Unscrew screw (8) from nut (9) and remove along with washers (10). Remove coil (2) from bracket (11).

(6) Remove screw (12) from ignition coil (2) and remove grounding bar (13).

(7) Tag and detach electric lead (14) at connector (3).

(8) Remove screw (15) along with washer (16). Remove ignition amplifier (17).

b. Inspection

Clean hardware and brackets in solvent. Do not soak coil or amplifier in solvent. Inspect hardware and brackets for damage.

Replace unserviceable components.

c. Assembly

(1) Position ignition amplifier (17) on fan housing and secure with screw (15) and washer (16).

(2) Re-attach amplifier lead as tagged.

(3) Position ground bar (13) onto ignition coil and secure with screw (12).

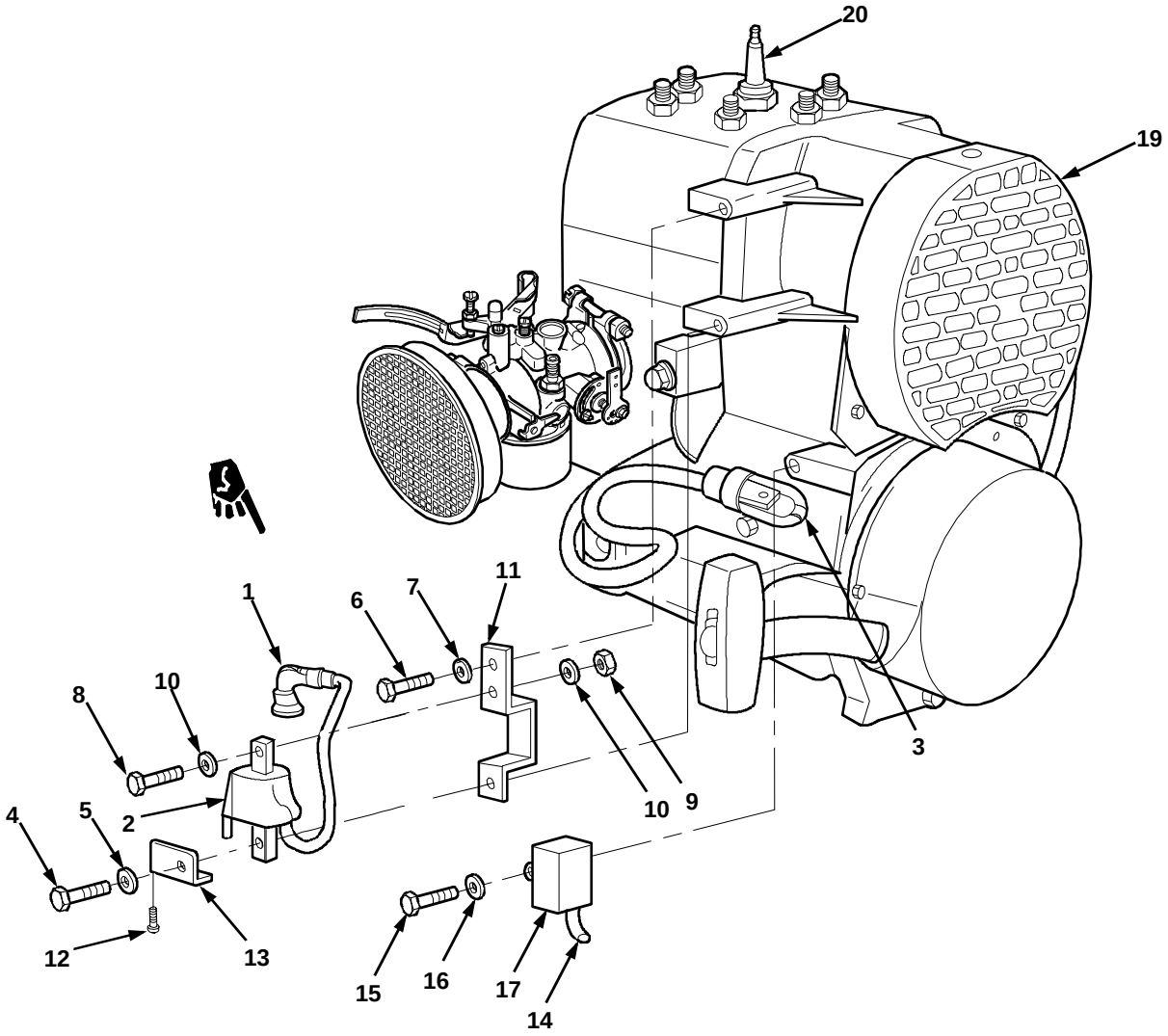
c. Assembly - Continued

(4) Position bracket (11) onto ignition coil and secure with screw (8) and nut (9) making sure washers (10) are in place.

(5) Position assembled ignition coil (2) in place on fan housing (19) and secure with screws (4 and 6) making sure washers (5 and 7) are in place.

(6) Re-attach primary lead of ignition coil (2) at plug connector (3).

(7) Attach spark plug cap (1) to spark plug (20).



2-15.3 STARTER MAINTENANCE - 215 cc ENGINE

This task consists of: **Replace**
a. Removal
b. Cleaning and Inspection
c. Repair
d. Installation

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)

Materials Required:
Brush, Varnish (Item 4, App D)
Cleaning Solvent (Item 21, App D)

Equipment Conditions:
Engine shut down and cold

Replace

a. Removal

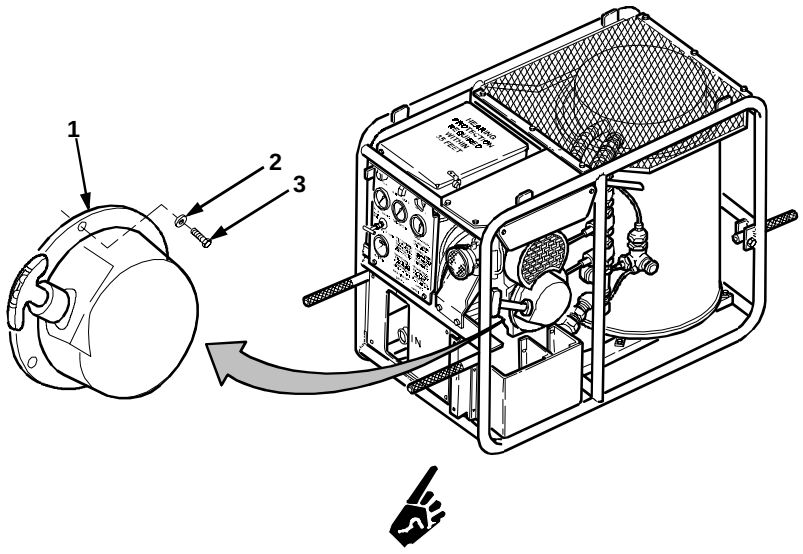
NOTE

Before removing starter, note position of handle to facilitate reinstallation.

(1) Mark the location of recoil handle by scribing a line between recoil housing and fan housing.

(2) Remove four screws (3) and four washers (2) securing the recoil starter (1) using a 5mm allen wrench.

(3) Remove recoil starter (1).



b. Cleaning and Inspection

(1) Clean starter.

(2) Inspect starter for abraded or cut rope, dented or warped housing, worn pawls, and broken or split handle. Replace starter if rope is cut or abraded, housing is dented or warped, or pawls are worn.

c. Repair

Repair of the starter is limited to replacement of the handle.

(1) Pull starter rope out approximately 18 inches and tie a slip knot (4) at housing.

(2) Push rope (5) through handle (6) approximately 6 inches and remove reinforcement (7).

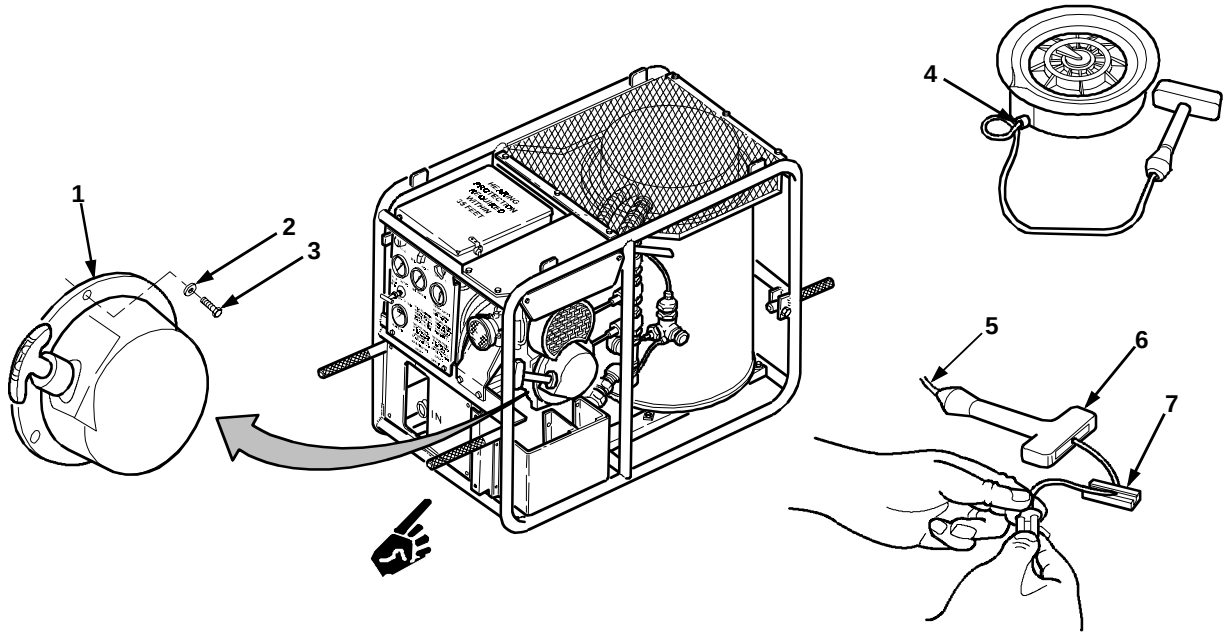
(3) Install new handle by threading rope through center. Thread rope through reinforcement and tie a knot in the end of rope. Position reinforcement in end of rubber handle. Handle can be replaced/installed with starter installed on engine or removed.

(4) Untie slip knot and check spring tension by pulling on handle.

d. Installation

(1) Position starter on engine and align scribe marks.

(2) Secure with four screws (3) and washers (2).



2-15.4 FAN ASSEMBLY MAINTENANCE - 215 cc ENGINE

This task consists of: **Repair**
a. Inspection (Belt Tension)
b. Removal
c. Cleaning and Inspection
d. Replacement

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)
Shop Equipment, Automotive Org. #1, Common (SC 4910-95-A74)

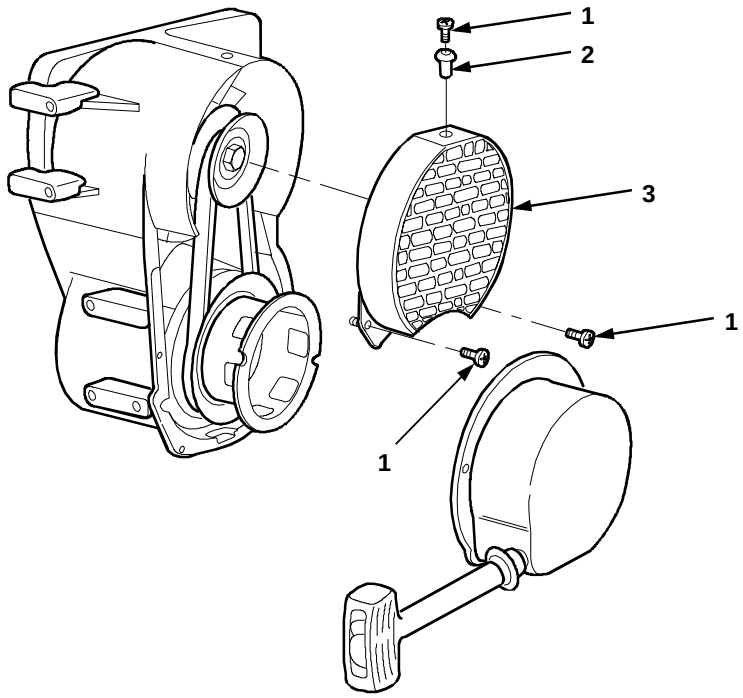
Materials Required:
Cleaning Solvent (Item 21, App D)

Equipment Conditions:
Engine shut down and cold
Starter Removed (page 2-47.2)

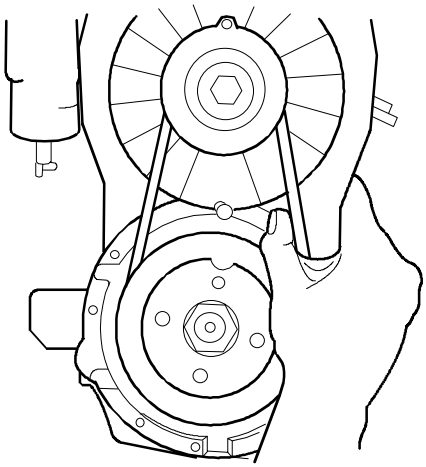
Repair

a. Inspection (Belt Tension)

(1) Remove three screws (1) and Ny-Drive (2). Remove plastic fan guard (3).



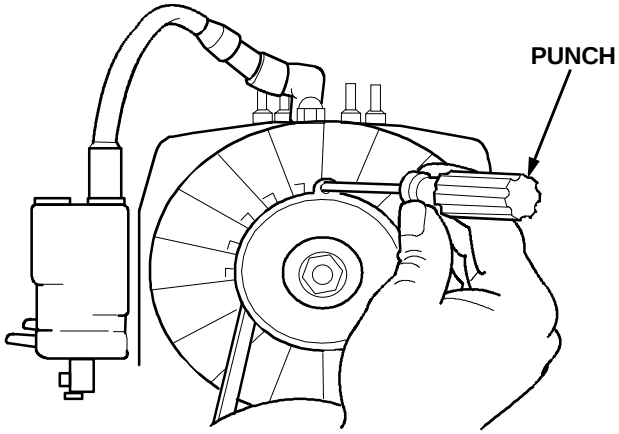
(2) Check V-belt for cracks and proper tension. Proper belt tension is 1/8-inch belt deflection between the upper and lower pulleys. If V-Belt is cracked or otherwise worn, replace.



b. Removal

The V-belt is replaced and adjusted in the following manner:

(1) Insert a punch through the indexing hole, located just above the upper pulley. Hold light pressure against the punch and rotate the impeller until the punch slides into the impeller body hole.



2-15.4 FAN ASSEMBLY MAINTENANCE - 215 cc ENGINE - Continued

b. Removal - Continued

NOTE

Install the same amount of spacers between the pulley halves as found during disassembly. Check for proper V-belt tension and adjust if necessary.

(2) Remove the fan shaft nut (1), using a 17 mm socket.

(3) Remove the lockwasher (2), heavy backing washer (3), flat washers (4), spacers (6), and pulley half (5).

(4) Remove spacers (6), inner pulley half (7), and washer (8).

c. Cleaning and Inspection

(1) Clean all washers, spacers, and pulley halves in solvent. (Item 22, App D.)

(2) Inspect pulley halves, washers, and spacers for wear, corrosion, indentations. Replace defective components.

(3) Inspect V-belt (9) for cracks or excessive wear. Replace if cracked or worn.

d. Replacement

(1) Replace washer (8), inner pulley half (7), and spacers (6).

(2) Replace V-belt (9), by slipping new belt over lower pulley half and positioning against upper pulley half.

NOTE

Remember to rotate engine crankshaft while tightening the fan shaft nut. This will allow the belt to work its way out to the outer diameter of the pulley.

(3) If not already done, remove the punch from the fan housing. Reinstall the outside pulley half (5), flat washers (4), backing washer (3), lockwasher (2) and nut (1). Slowly tighten the nut. While tightening the nut, rotate the engine crankshaft by turning the starter carrier (10).

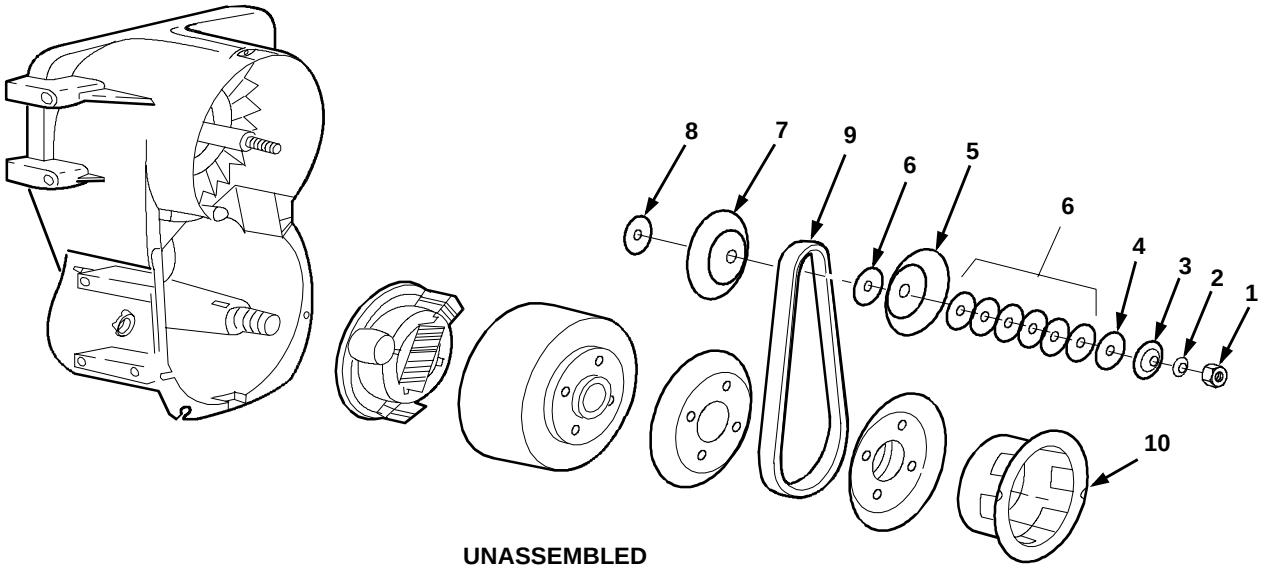
(4) Check V-belt (9) for proper tension. Proper belt tension is 1/8-inch belt deflection midway between upper and lower pulleys when pressure is applied.

(5) If belt adjustment is required, remove or add spacers (6) between pulley halves. Add spacers (6) to loosen belt. Remove spacers (6) to tighten belt.

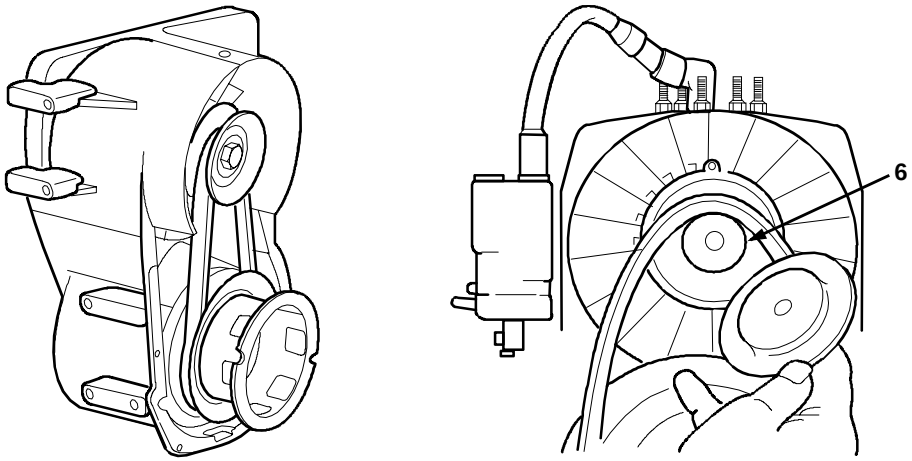
(6) With the belt located at the outer diameter of the pulley, reinstall the punch to secure the shaft. Torque the nut 20-22 ft lbs.

(7) Reinstall fan guard (3) and secure with Ny-Drive (2) and three screws (1).

(8) Reinstall recoil starter (page 2-47.3).



UNASSEMBLED



ASSEMBLED

2-16. CARBURETOR MAINTENANCE

This task consists of:
a. Deleted
b. Adjust (Engine Speed)
c. Idle Speed Adjustment
d. Replace
e. Repair

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)
Shop Equipment, Automotive Org. #1, Common (SC 4910-95-A74)
RPM Indicator (Item 5, Figure C-61)

Materials Required:
Brush, Varnish (Item 4, App D)
Cleaning Solvent (Item 21, App D)
Oil, Lubricating (Item 11, App D)

Equipment Conditions:
Engine shut down and cold

a. Deleted

All data on pages 2-49 and 2-50 deleted.

b. Adjust (Engine Speed)

NOTE

It may be necessary for two people to do this task.

Dial indications must be multiplied by 1000. The number 4 represents 4000 rpm.

(1) Adjust dial (10) on rpm indicator (11) so that dial is between 4200 and 4400 rpm. Wire (9) should now be extended approximately 3 inches.

(1.1) Ensure water source is connected to water inlet coupling.

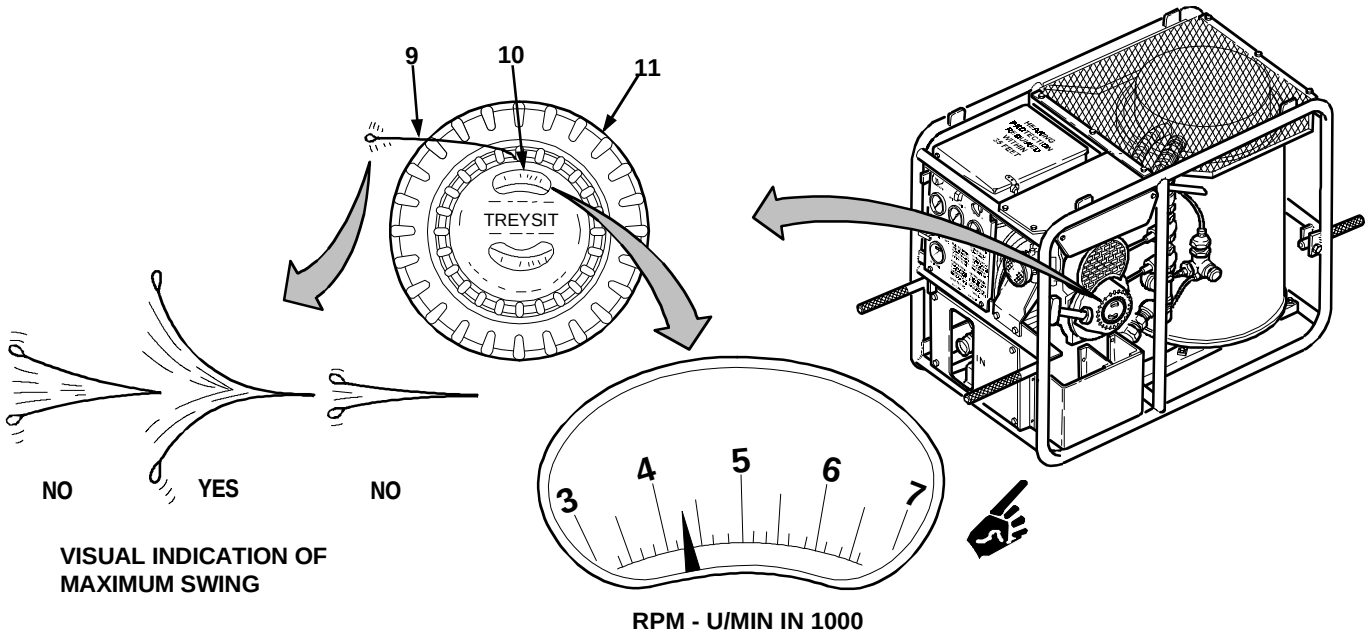
(2) Start engine and move throttle to MAX open position.

(3) With engine operating at maximum speed, and with at least 100 psi on water gauge, hold rpm indicator (11) firmly against engine starter as shown.

(4) While holding rpm indicator in place, rotate dial (10) to the left, then right. Watch wire (9) as dial is moved. When wire vibrates at maximum swing, stop rotating dial. Read dial indication.

(5) If rpm indication is less than 4200 or greater than 4400, go to step 7.

(6) If rpm indication is between 4200 and 4400, no carburetor adjustment is required; go to step 11.



2-16. CARBURETOR MAINTENANCE - Continued

b. Adjust (Engine Speed) - Continued

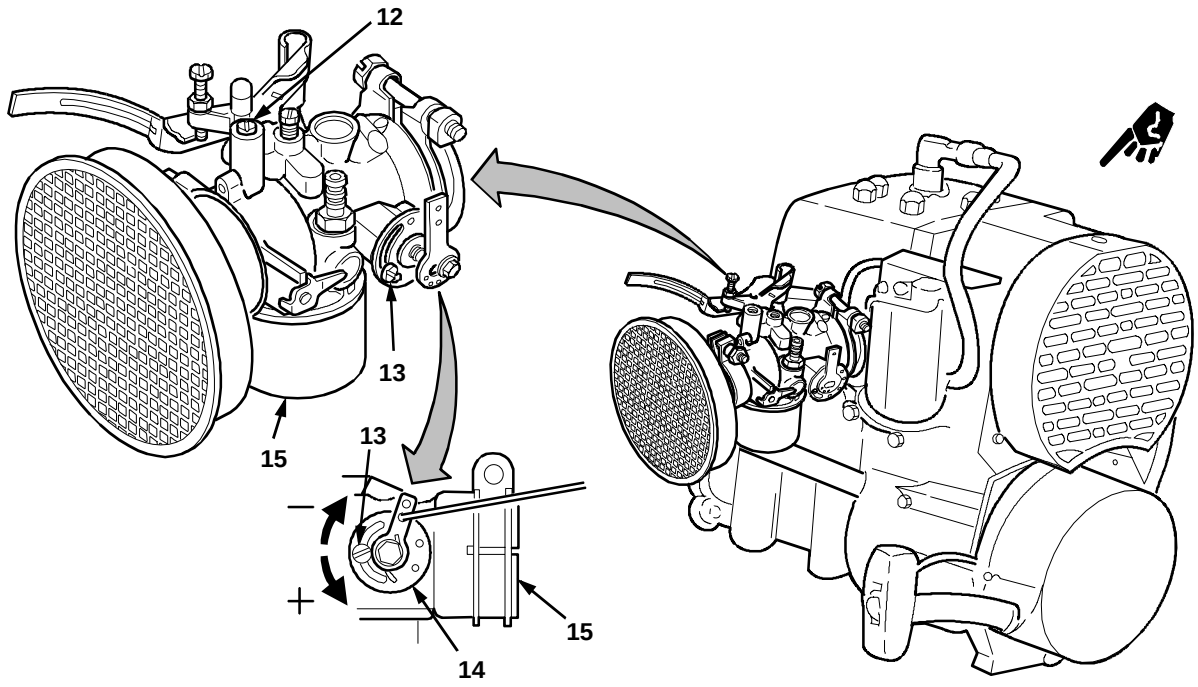
(7) On carburetor (15), turn adjustment screw (12) fully CW, then quickly back-off 1-1/2 turns. If rpm indicator wire vibrates at maximum swing, engine rpm is now between 4200 and 4400; go to step 11. If not, proceed with step (8).

(8) Loosen screw (13) on speed setting disk (14) slightly.

(9) Set dial indicator to exactly 4300 rpm and slowly turn speed setting disk (14) until rpm indicator wire vibrates at maximum swing. (Turning the speed setting disk CW decreases and CCW increases engine speed.)

(10) While holding speed setting disk (14) in place, tighten screw (13) when maximum swing is reached at 4300 rpm.

(11) Shut down engine.



c. Idle Speed Adjustment. Engine idle speed is adjusted in the following manner:

(1) Operate engine until operating temperature has been obtained (approximately 5 minutes).

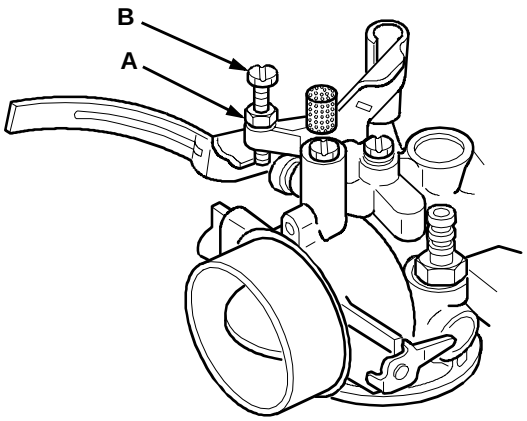
(2) Loosen jam nut "A" until adjusting screw "B" moves freely.

NOTE

Idle Speed is <u>increased</u> by turning screw "B" CW and <u>decreased</u> by turning screw CCW.

(3) Turn the adjusting screw CW or CCW until the engine operates smoothly at the lowest operating speed (pump pulley should not be turning).

(4) Turn jam nut "A" to lock adjusting screw "B" in position.



d. Replace

(1) Removal

(a) Remove fuel line (16) from carburetor.

(b) Loosen clamp (17) and carefully separate carburetor from intake manifold. Tilt carburetor sideways and disconnect linkage (18) from throttle lever.

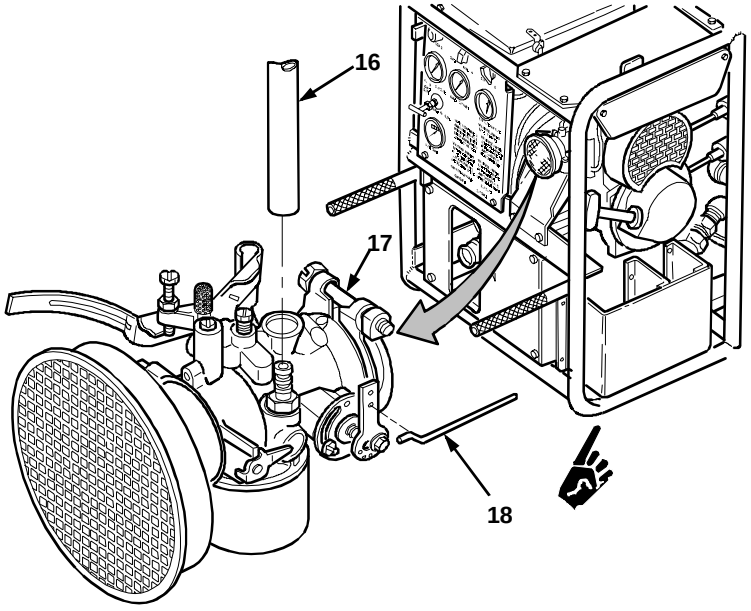
(2) Installation

(a) Connect linkage (18) to throttle lever. Linkage must be installed in bottom hole of lever as indicated.

(b) Position carburetor on engine intake manifold, and tighten clamp (17).

(c) Connect fuel line (16).

(d) Adjust engine speed (page 2-51).



2-16. CARBURETOR MAINTENANCE - Continued

e. Repair

(1) Disassembly

(a) Remove carburetor from engine (page 2-53).

(b) Loosen clamp (2) and remove air filter (1).

(c) Remove main jet (20), bowl (19), and gasket (15).

CAUTION

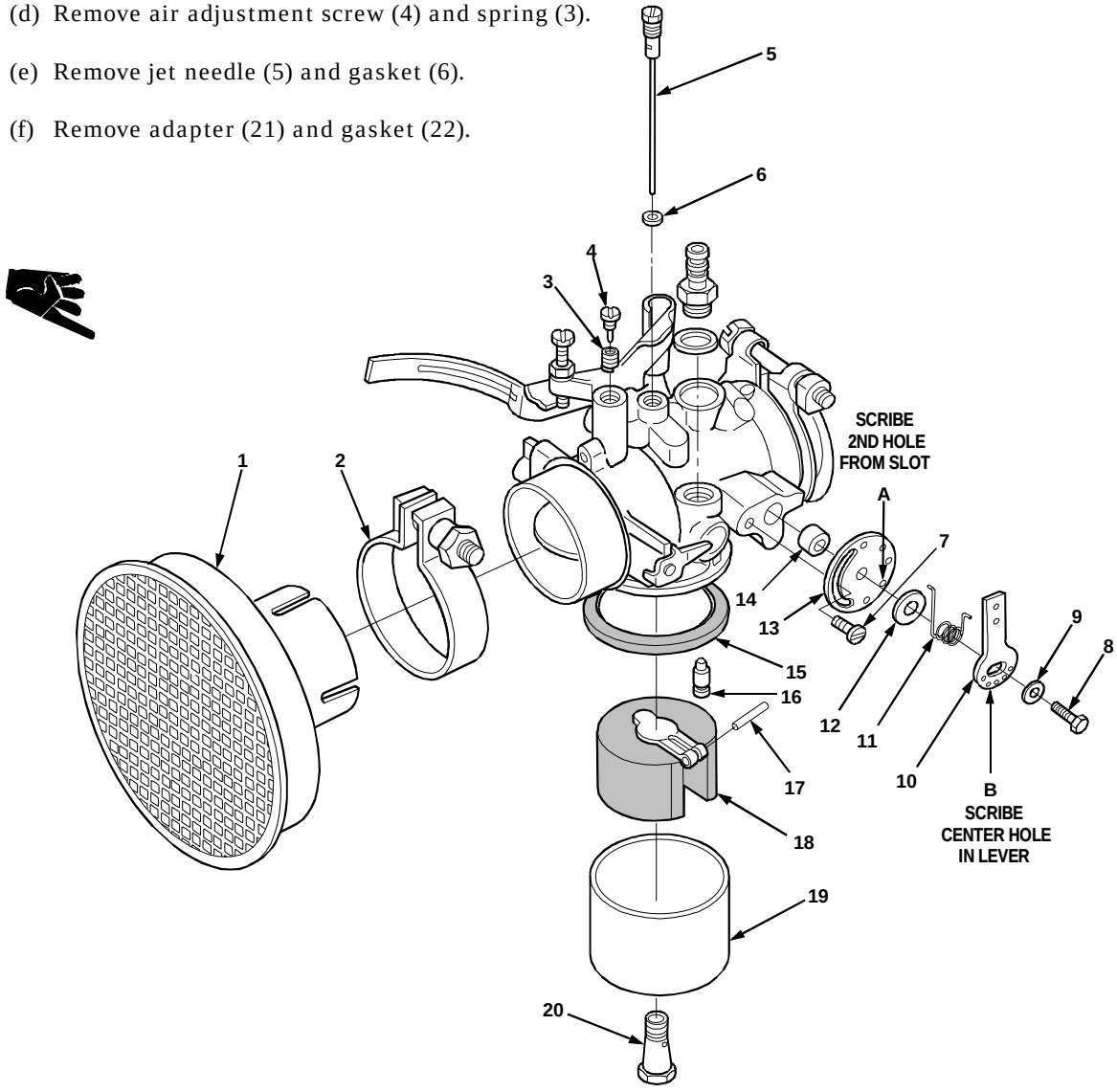
Hinge pin (17) is tapered and can be only removed in one direction. Attempting to remove in opposite direction may damage carburetor.

(c) Turn carburetor upside down and remove hinge pin (17), float (18), and float needle (16).

(d) Remove air adjustment screw (4) and spring (3).

(e) Remove jet needle (5) and gasket (6).

(f) Remove adapter (21) and gasket (22).



NOTE

Mark location of spring (11) where it is connected onto lever (10) and mark which hole of speed setting disk that spring is connected to.

(g) Remove screw (8), washer (9), lever (10), spring (11), washer (12), throttle screw (7), speed setting disk (13), and spacer (14).

NOTE

Make sure tapered end of hinge pin (17) is inserted first.

(h) Install float needle (16) on float (18) and secure float to carburetor with hinge pin (17).

(i) Install gasket (15), bowl (19), and jet (20).

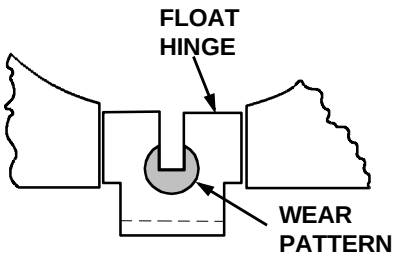
(j) Install air filter (1) and clamp (2). Tighten clamp (2).

(2) Cleaning

Wash filter and carburetor bowl in cleaning solvent. Clean all other parts with brush and solvent. Apply light coating of oil to outer surface of air filter.

(3) Inspection

(a) Position float (5) so that brass hinge groove is facing up. Compare float wear pattern with illustration. If float wear is found in circled area, replace entire carburetor.



(b) Inspect air filter (1) for punctures or damage to filter element.

(c) Inspect throttle linkage for binding, missing, or damaged components. Replace entire carburetor if any part is worn.

(d) Inspect carburetor body for cracks, dents, or missing components. Replace entire carburetor if body is charred or badly dented.

(e) Inspect jet and adjusting screws for nicks, burrs, or stripped threads. Replace entire carburetor if any part is defective.

(f) Inspect float needle and gasket for wear. Replace entire carburetor if either is worn.

(4) Assembly

(a) Engage float needle (16) in hinge slot of float and reinstall float (18) on carburetor with hinge pin (17).

(b) Reinstall gasket (15), bowl (19), and jet (20).

(c) Install filter (1) with clamp (2).

(d) Reinstall carburetor (page 2-53).

All data in paragraph 2-17, pages 2-56 and 2-57, deleted.

2-18. JUNCTION BOX ASSEMBLY MAINTENANCE

This task consists of: **Repair**
a. Deleted
b. Deleted
c. Replacement of Turnlock Fastener

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)
Pliers, Special (Item 3, Figure C-61)
Tool, Camloc Fasteners (Item 2, Figure C-61)

Materials Required:
Cleaning Solvent (Item 21, App D)
Brush, Varnish (Item 4, App D)

Equipment Conditions:
Engine shut down and cold

a. Deleted.

b. Deleted.

c. Replacement of Turnlock Fastener

(1) Using special pliers, grasp stud assembly (1) with fork of pliers below stud shoulder and compress spring of stud assembly with pliers. Remove stud assembly.

(2) Insert a screwdriver in split of split ring (2) and remove ring with a twist of the screwdriver.

(3) Remove grommet (3).

(4) Clean stud mounting hole, using cleaning solvent and brush and allow to dry.

(5) Insert grommet (3) through stud mounting hole and secure with split ring (2) as follows:

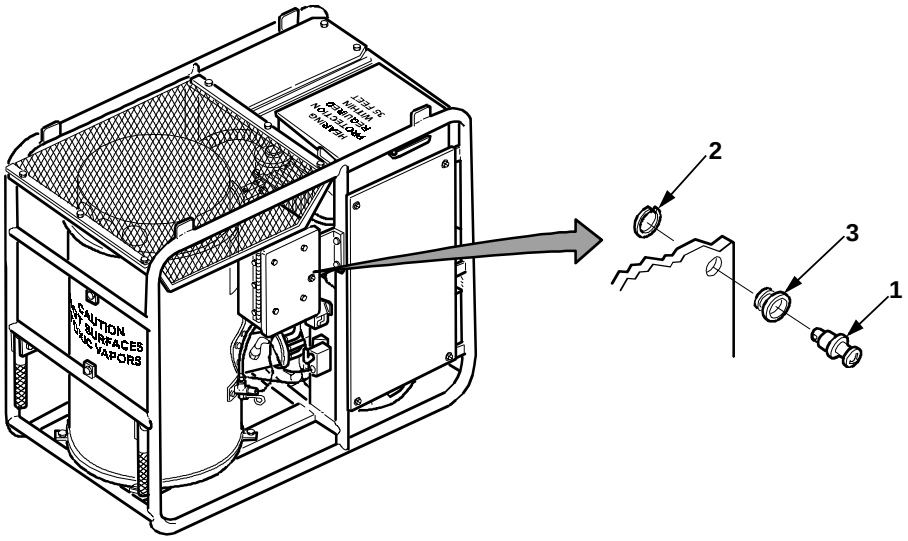
(a) Position split ring on narrow end of mandrel (part of camloc fastener).

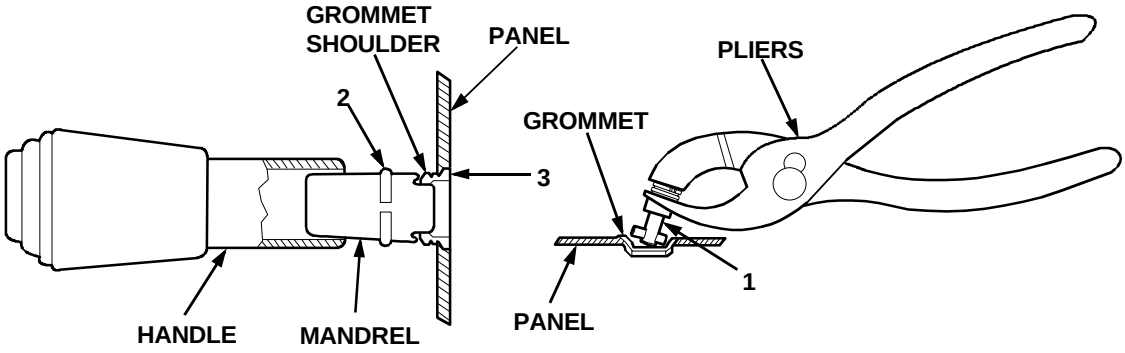
(b) Position larger end of mandrel inside of grommet.

(c) Place handle over mandrel and push against panel until ring snaps in place.

(6) Grasp replacement stud assembly (1) with fork of pliers below shoulder of stud assembly and squeeze handles to compress stud assembly spring.

(7) Insert stud assembly through grommet (3) and release pliers.


2
3
1


GROMMET
SHOULDER
PANEL
PLIERS
2
GROMMET
3
1
HANDLE
MANDREL
PANEL

2-19. PHOTOCELL AND TEE ASSEMBLY MAINTENANCE

This task includes: **Repair**
a. Removal and Disassembly
b. Assembly and Installation

INITIAL SET UP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)

Materials Required:
Brush, Varnish (Item 4, App D)
Cleaning Solvent (Item 21, App D)
Locking Compound (Item 6, App D)

Equipment Condition:
Engine shut down and cold

Repair

a. Removal and Disassembly

(1) Disconnect photocell cooling hose assembly (1) from nipple (2).

(2) Disconnect photocell assembly wires (33 and 34) from junction box (TB2-5 and TB2-6) and pull wires out of junction box.

(3) Being careful that mica window doesn't fall, remove two bolts (10), washers (12), lockwashers (11), mica window (13), spacer (14) and tee (3).

(4) Loosen setscrew (9) and remove photocell assembly (4) from tee (3).

(5) Remove nipple (2) from tee (3).

(6) Remove elbow (8) from tee (3).

(7) Remove sleeve (7), and nut (6) from tube (5), if required.

b. Assembly and Installation

(1) Clean all components (except photocell assembly (4) and mounting surfaces) with cleaning solvent and brush. Inspect for serviceability. Wipe photocell assembly with rags, making sure photo element (eye) is clean.

(2) Position spacer (14), mica window (13), and tee (12) on heat exchanger assembly and secure with two screws (10), washers (12) and lockwashers (11).

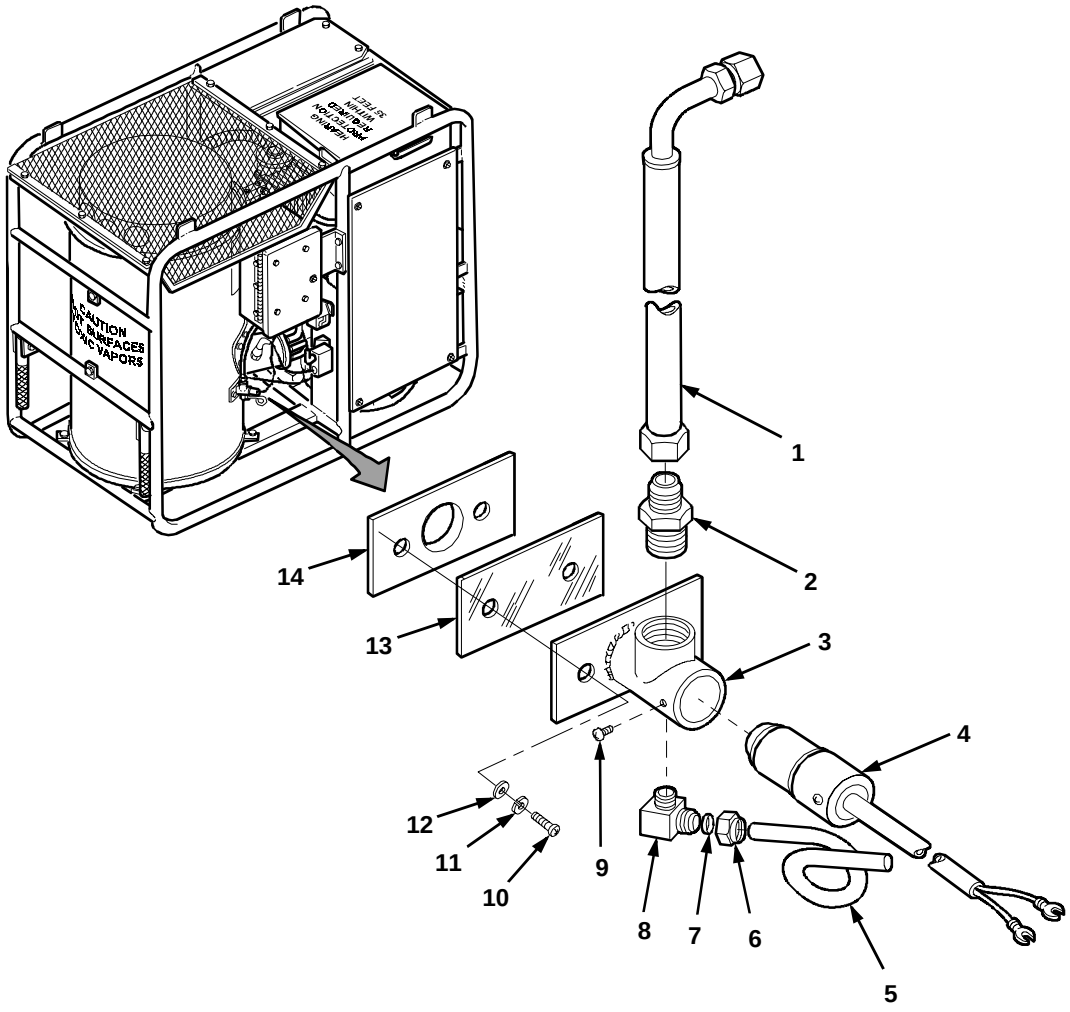
(3) Install nipple (2) on tee (3), using locking compound.

(4) Install elbow (8) on tee (3), using locking compound.

(5) Position nut (6) and sleeve (7) on tube (5), then install nut on elbow (8).

(6) Install photocell assembly (4) on tee (3) with screw (9), being careful not to crack photocell, and connect wire 33 to TB2-5 and wire 34 to TB2-6.

(7) Reconnect photocell cooling hose (1) to nipple (2).



2-20. PHOTOCELL COOLING HOSE ASSEMBLY MAINTENANCE

This task includes: **Repair**
a. Removal and Disassembly
b. Assembly and Installation

INITIAL SET UP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)

Materials Required:
Bulk Hose (MIL-H-13444, Type 1)

Equipment Condition:
Engine shut down and cold

a. Removal and Disassembly

(1) Disconnect hose assembly at photocell and tee assembly (4) and engine.

(2) Remove elbow (1).

(3) Remove connector (3).

(4) Cut tiedown straps as necessary and remove hose (2).

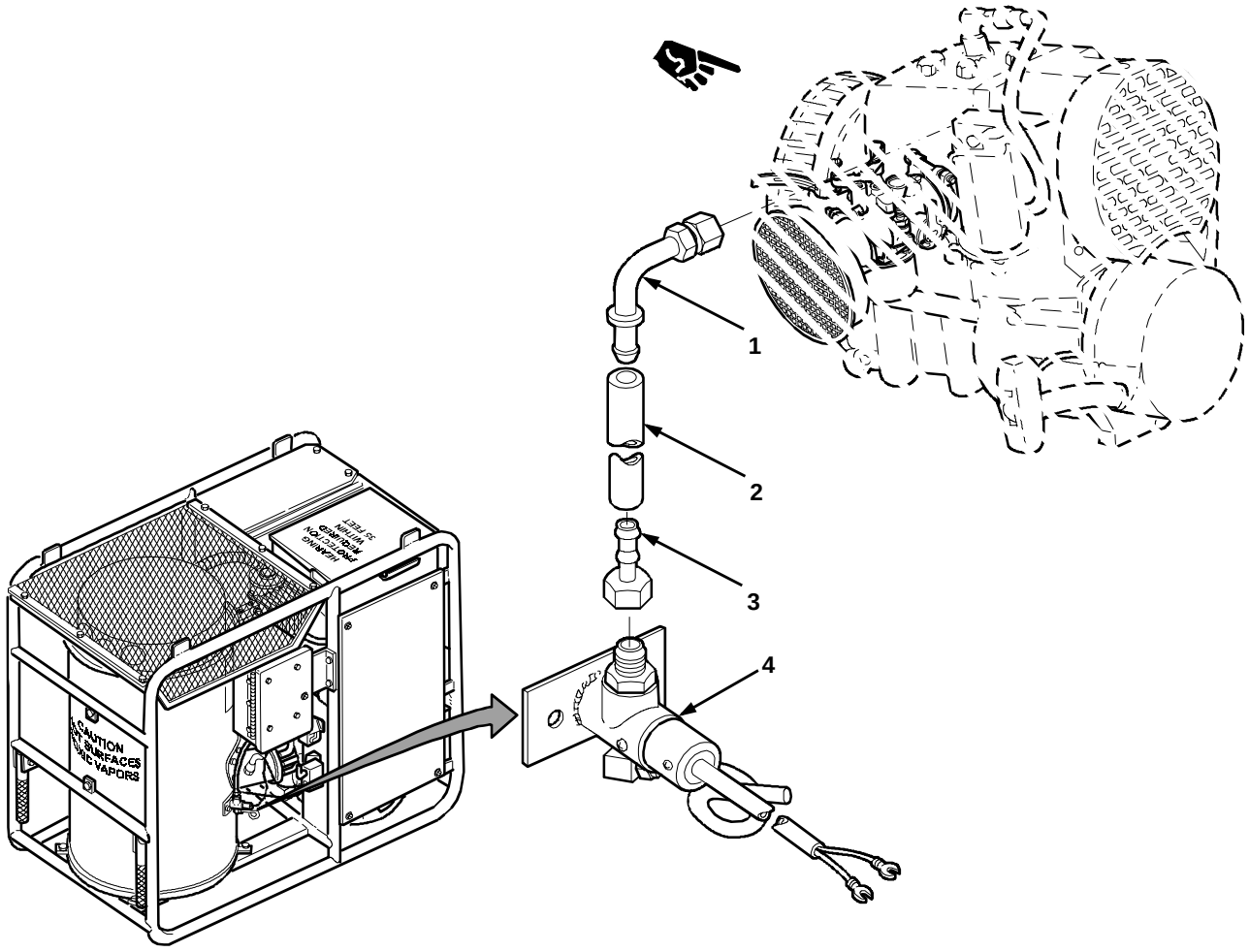
b. Assembly and Installation

(1) As required, cut 36-inch length of hose (2) from bulk hose.

(2) Install connector (3) and elbow (1) on hose (2).

(3) Thread hose assembly through frame and connect elbow to engine nipple as indicated.

(4) Connect other side of hose assembly to photocell and tee assembly (4).


1
2
3
4
CAUTION
HOT SURFACES
TOXIC VAPORS

2-21. BURNER FUEL SYSTEM MAINTENANCE

This task includes:
- **a. Inspect**
- **b. Repair**
  - **(1) Replacement of Hoses and Fuel Can Components**
  - **(2) Replacement of Pressure Regulating Valve**

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)

Materials Required:
Brush, Varnish (Item 4, App D)
Cleaning Solvent (Item 21, App D)
Bulk Hose (MIL-H-13444, Type 1)

Equipment Conditions:
Engine shut down and cold

a. Inspect

(1) Remove panel (3) and inspect fuel system for leaking fuel cans, hoses, and connections.

(2) Inspect strainer (10) for holes in screen and dirt accumulation. Clean as necessary; reject if screen is damaged or corroded.

(3) Inspect gasket (15) for corrosion or damage. Replace as necessary.

b. Repair

(1) Replacement of Hoses and Fuel Can Components

(a) Open tool box door and remove all components of fuel system.

(b) Cut tiedown straps (11) and remove strainer (10).

(c) Remove hose (14).

(d) Remove hose (13) from lid assembly and separate from tube (12).

(e) Remove hose assembly (1 and 2).

(f) Remove gasket (15).

(g) Cut strap (17) and remove tag (4).

(h) Clean all parts using cleaning solvent and brush, allow to dry and inspect for serviceability. Discard unserviceable parts.

(i) Install strainer (10) on hose (14) made from bulk hose, cut 14-1/2 inches in length. Secure with two straps (11).

(j) Connect hose (14) to lid assembly (16) and install gasket (15).

(k) Install hose (13) on metal tube (12) and connect to lid assembly (16).

(l) Connect hose assemblies (1 and 2) to connectors inside tool box. Attach fuel suction hose (1) to larger nipple on lid assembly and fuel return hose (2) to smaller nipple and lid assembly (16).

(m) Install tag (4) with strap (17).

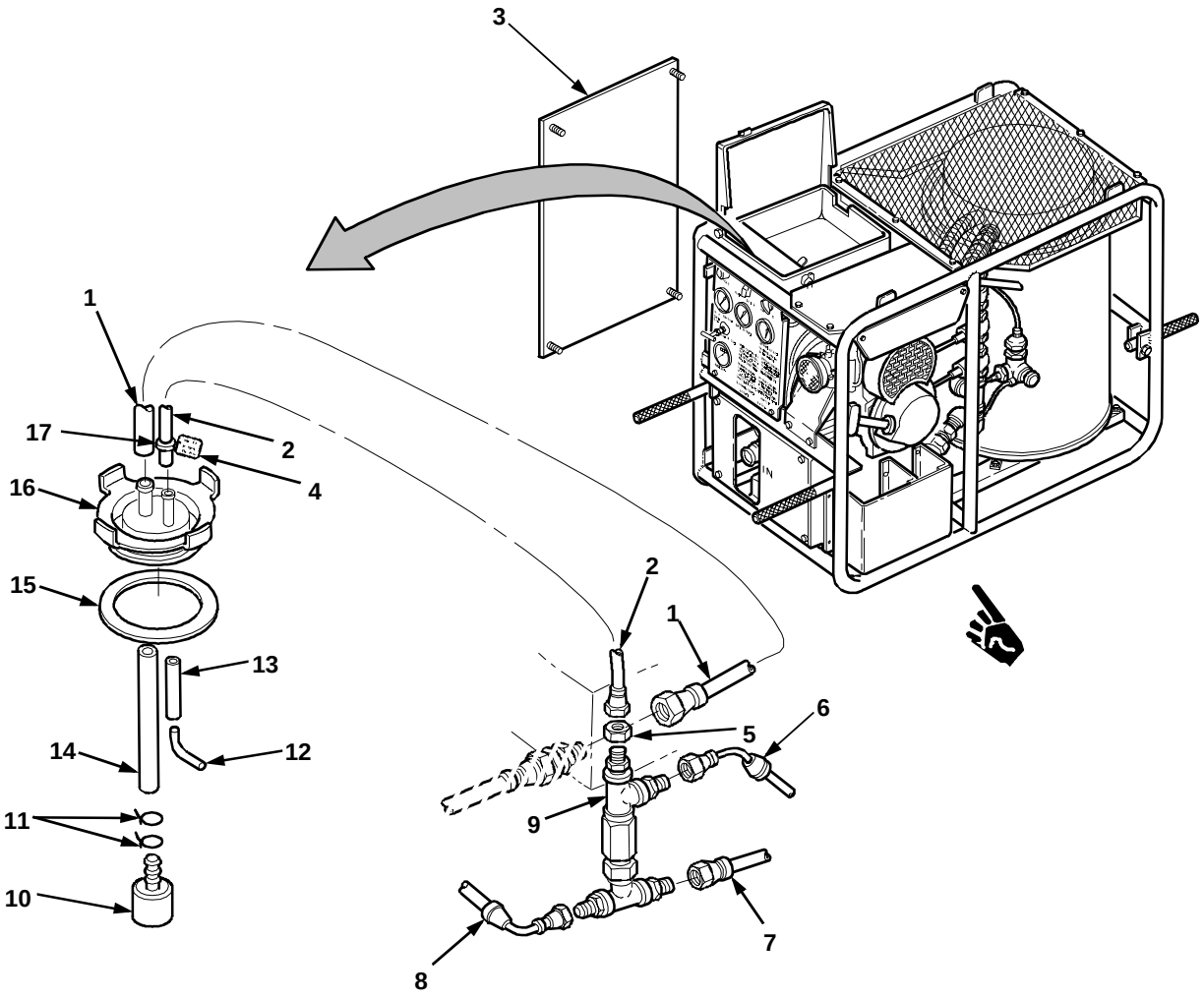
(2) Replacement of Pressure Regulating Valve

(a) Tag and disconnect four fuel hoses (2, 6, 7, and 8).

(b) Remove nut (5) and pressure regulating valve (9).

(c) Position replacement pressure regulating valve on bottom of tool box and secure with nut (5).

(d) Reinstall hoses (2, 6, 7, and 8).



2-22. HEATER FUEL FILTER MAINTENANCE

This task includes:
- **a. Replace**
  - **(1) Removal**
  - **(2) Installation**
- **b. Repair (Replace Element)**
  - **(1) Disassembly**
  - **(2) Assembly**

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)

Materials Required:
Cleaning Solvent (Item 21, App D)
Brush, Varnish (Item 4, App D)
Tags (Item 25, App D)
Locking Compound (Item 6, App D)

Equipment Conditions:
Engine shut down and cold

NOTE

There are two different heater fuel filter assemblies installed on the M17. The original "A" version has a glass bowl. The "B" version has a shallow plastic bowl. Even though the filter assemblies are interchangeable, the filter parts are not. Know what filter you have prior to ordering parts or attempting maintenance. If the filter assembly requires replacement, replace with the "B" version.

a. Replace

(1) Removal

(a) Remove drive side panel (12) (page 2-32).

(b) Loosen thumb nut (9) and drain fuel from filter. Be sure to catch fuel in any available container.

(c) Tag and disconnect hose (10) by first disconnecting at tool box connection and then at nipple (13) on filter.

(d) Tag and disconnect hose (11) by first disconnecting at fuel pump connector and then at nipple (13) on filter.

(e) Remove two nuts (1), bolts (7), washers (2 and 6), and filter assembly (8).

(f) Remove two nipples (13), bolt (3), washer (4), and two plugs (5).

(2) Installation

(a) If you have version "A", install plugs (5), bolt (3), washer (4), and nipples (13), and plugs (5) on fuel filter.

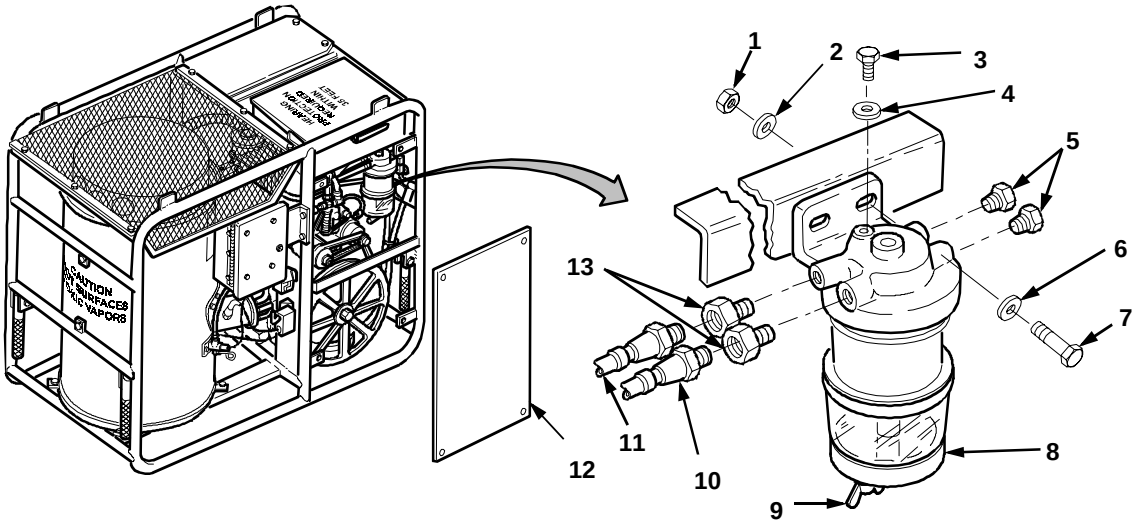
(b) If you have version "B", install nipples (13) on fuel filter.

(c) Install filter on frame with two bolts (7), washers (2 and 6), and nuts (1).

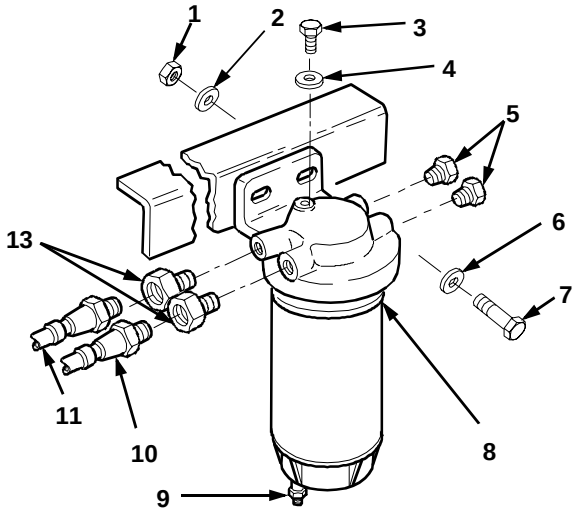
(d) Apply locking compound to connector threads and install hose (11) by first connecting it to nipple (13) on filter then to fuel pump as tagged.

(e) Apply locking compound to connector threads and install hose (10) by first connecting it to nipple (13) on filter, then to tool box connector as tagged.

(f) Reinstall drive side panel (12).



VERSION "A"



VERSION "B"

2-22. HEATER FUEL FILTER MAINTENANCE - Continued

b. Repair (Replace Element)

NOTE

Repair may be performed on or off equipment.

(1) Disassembly

(a) Loosen thumbscrew (15) or (18) and drain fuel from sediment bowl, being sure to catch fuel in any available container. Remove thumbscrew (15) and gasket (16) when all fuel is drained.

(b) Unscrew bolt (3) while keeping light upward pressure on filter bottom (14). Remove filter bottom (14), bowl (12) and filter element (10) as a unit and separate. Version "B" — Unscrew filter element (21) and attached bowl assembly (19) from filter head (22).

(c) Remove gasket (13) from filter bottom (14), gasket (11) from bowl (12) and gaskets (8 and 9) from filter head (17). Version "B" — Remove bowl assembly (19) and gasket (20) from filter element (21). Retain bowl assembly (19) and gasket (20) for later reuse.

(d) Remove two nuts (1), bolts (7) and washers (2 and 6). Version "B" — Remove filter head (22).

(e) Remove bolt (3), washer (4), gasket (5) and filter head (17).

(f) Clean all parts with cleaning solvent and inspect for serviceability. Discard unserviceable parts and all gaskets for which replacement is provided with filter element kit.

(2) Assembly

(a) Position bolt (3), washer (4) and gasket (5) on filter head (17) and secure filter head (17) or (22) to frame with bolts (7), washers (2 and 6) and nuts (1).

NOTE

Gasket (9), provided in filter element kit, is identified with a blue mark on outer rim and is larger than gasket (11), which is also part of the kit. Be sure not to interchange.

(b) Install gaskets (8 and 9) on filter head (17).

(c) Install gasket (13) on filter bottom (14).

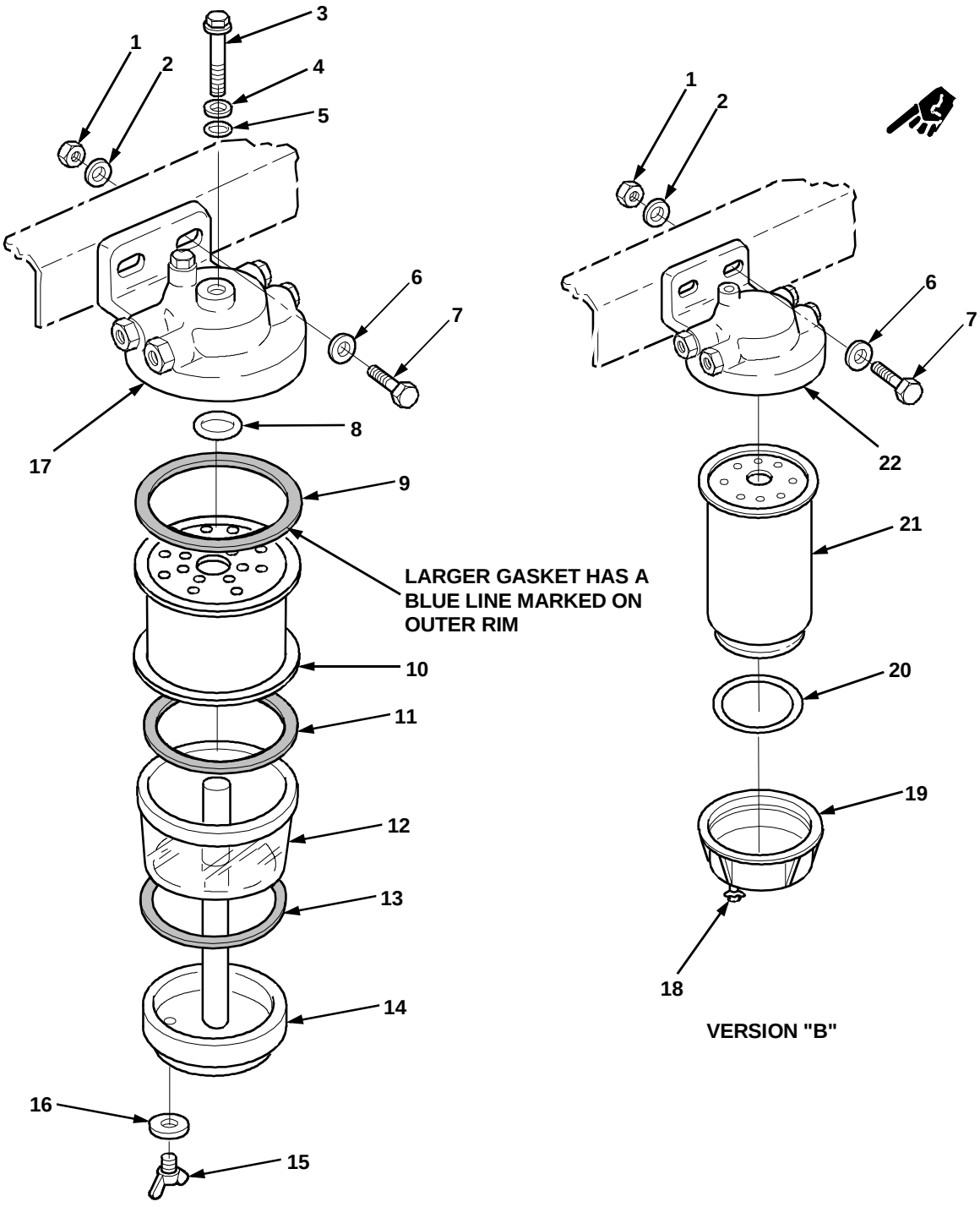
(d) Install gasket (11) on bowl (12).

(e) Position filter element (10), bowl (12) and filter bottom (14) on filter head (17).

(f) Turn filter assembly so that thumbscrew will be positioned outward. Carefully aline all components and tighten bolt (3), making sure gaskets remain in place.

(g) Install gasket (16) and thumbscrew (15).

(h) Version "B" — Install gasket (20) into bowl assembly (19) and screw onto filter element (21). Screw filter element (21) with attached bowl assembly (19) onto filter head (22).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LARGER GASKET HAS A BLUE LINE MARKED ON OUTER RIM
VERSION "A"
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VERSION "B"

2-23. CONTROL PANEL ASSEMBLY MAINTENANCE

This task includes: **Repair**
a. Replacement of Bulb
b. Replacement of Elapsed Time Meter

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)

Equipment Condition:
Engine shut down and cold

Repair

a. Replacement of Bulb

(1) Unscrew silver pushbutton cover (1).

(2) Unscrew red lens (2) and snap out plastic cup (3).

(3) Remove bulb (4) from receptacle (5). Removal requires a light inward push and a 1/4 counterclockwise twist.

(4) Install replacement bulb (4).

(5) Reinstall cup (3), red lens (2) and pushbutton cover (1).

b. Replacement of Elapsed Time Meter

(1) Remove drive side panel (page 2-32).

(2) Tag and disconnect the electric leads from the back of the meter (8).

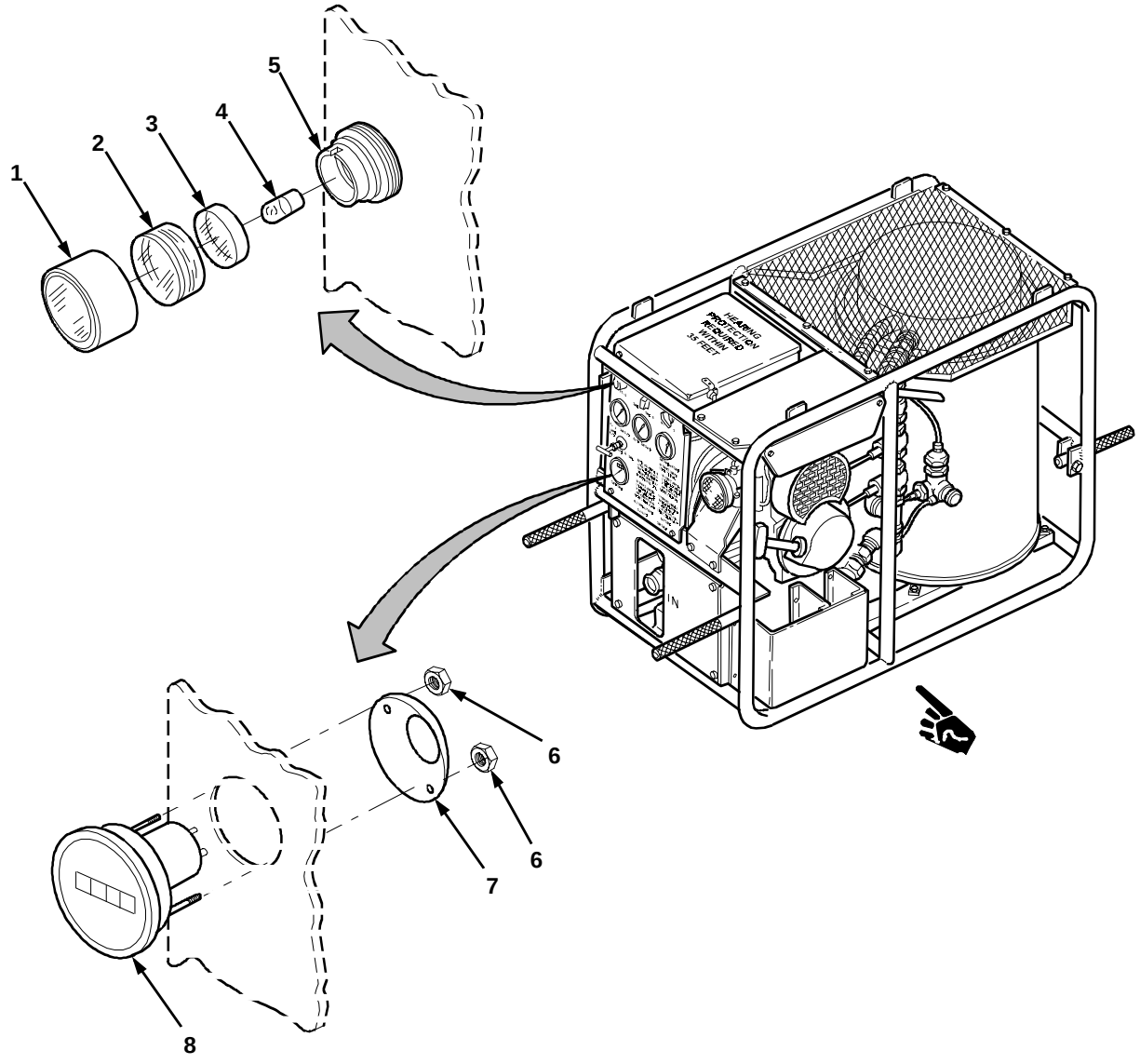
(3) Remove the two nuts (6) which retain the back portion of the meter back plate (7).

(4) Push the front half of the meter (8) out of the panel.

(5) Position and aline the replacement meter (8) in panel.

(6) Install the back portion of the meter (7), and secure with two nuts (6).

(7) Install the electric leads to the tabs on the back of the meter.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HEARING PROTECTION REQUIRED WITHIN 25 FEET

2-24. TOOL BOX ASSEMBLY MAINTENANCE

This task includes: **Repair**
a. Disassembly
b. Assembly

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)
Riveter, Blind, Hand (Item 9, Page B-7)

Materials Required:
Rags, Wiping (Item 17, App D)
Cleaning Solvent (Item 21, App D)

Equipment Conditions:
All items removed from tool box
Engine shut down and cold

Repair

NOTE

Repair of tool box is limited to cover, catch, and latch replacement.

a. Disassembly

(1) Open tool box.

(2) Remove two screws (3) and nuts (7).

(3) Remove cover (6).

(4) Remove catch (2) by cutting off rivet (1) heads with cold chisel.

(5) Remove latch (5) by removing rivets (4).

b. Assembly

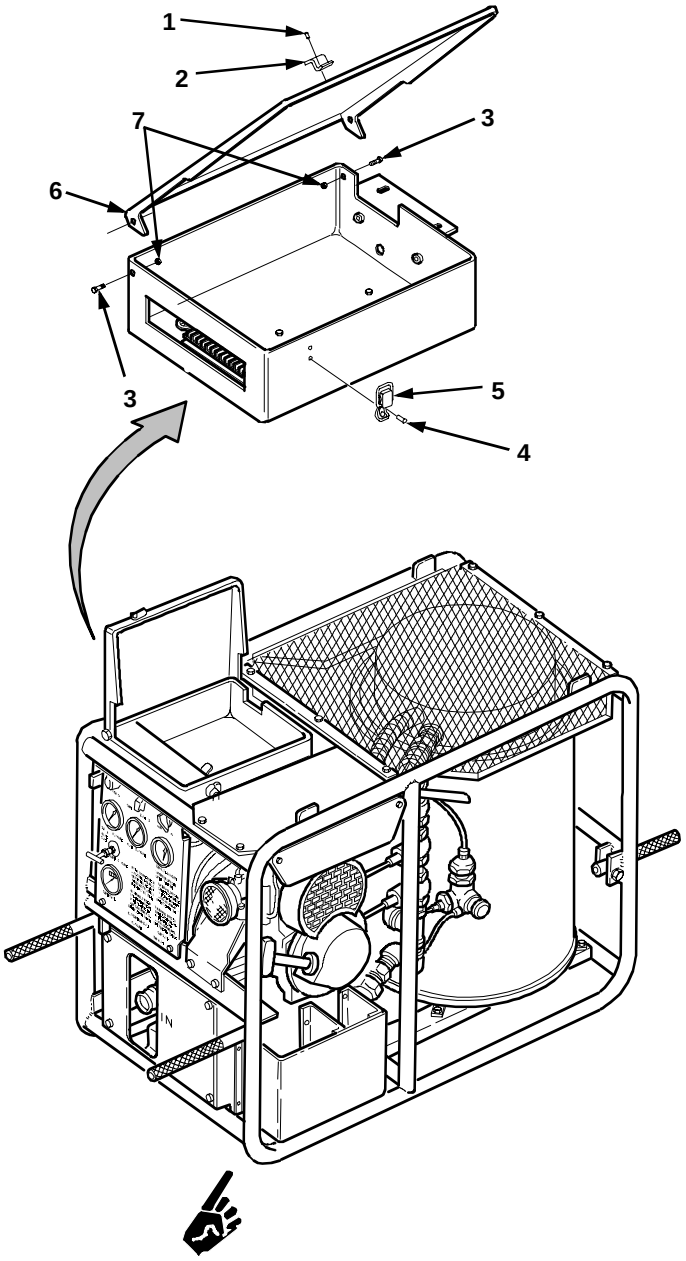
(1) Clean all parts with cleaning solvent and rags and inspect for serviceability.

(2) Install catch (2) with two rivets (1), using riveter.

(3) Install latch (5) with two rivets (4).

(4) Position cover (6) on tool box frame and secure with two screws (3) and nuts (7). (Screws function as hinge, do not over tighten.)

(5) Close cover.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2-25. WATER INLET ASSEMBLY MAINTENANCE

This task includes:
- **a. Replace**
  - **(1) Removal**
  - **(2) Installation**
- **b. Repair**
  - **(1) Replacement of Hose Assembly and Coupling**
  - **(2) Cleaning**

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)
Shop Equipment, Automotive Org. #1, Support (SC 4910-95-A73)
Shop Equipment, Automotive Org. #1, Common (SC 4910-95-A74)

Materials Required:
Sealant, Pipe (Item 18, App D)

Equipment Conditions:
Engine shut down and cold

a. Replace

(1) Removal

(a) Remove drive side panel (1) (page 2-32).

(b) Remove fuel pump belts (page 2-26) and water pump belt (page 2-26).

(c) Remove four bolts (3), lockwashers (4), washers (5), and panel (2).

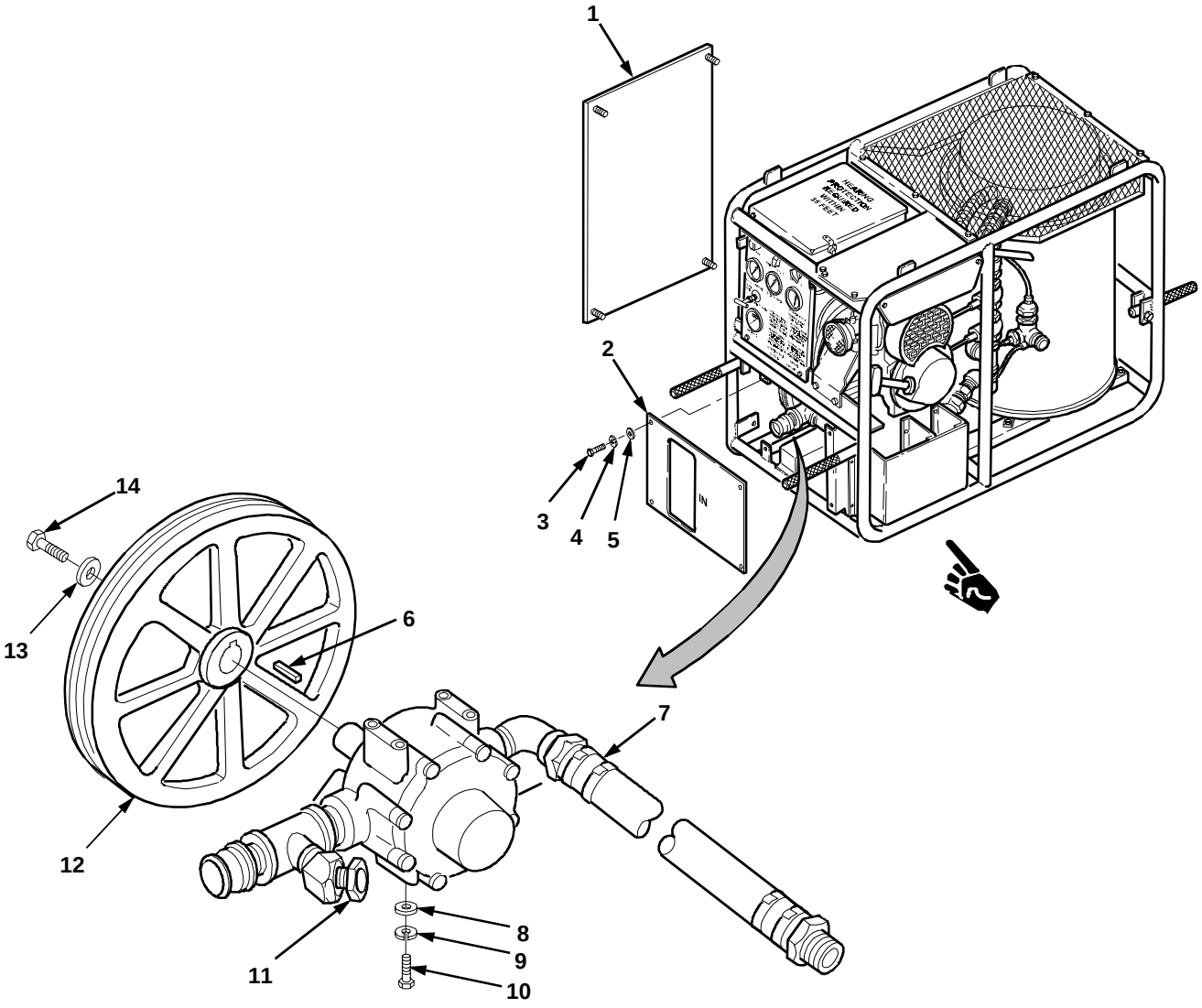
(d) Scribe position of pump on frame to make reinstallation easier.

(e) Remove bolt (14) and washer (13).

(f) Remove pulley (12) and key (6).

(g) Disconnect hose (7) at coil inlet assembly swivel and return hose (not shown) at 45° elbow swivel (11).

(h) Elevate pump and heater assembly at pump end to gain access to pump mounting hardware and remove four bolts (10), washers (8), lockwashers (9), and water inlet assembly.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2-25. WATER INLET ASSEMBLY MAINTENANCE - Continued

(2) Installation

(a) Position water inlet assembly on pump and heater assembly frame using scribe lines marked at disassembly, and secure with four washers (8), lockwashers (9), and bolts (10).

(b) Install pulley (12) with key (6), washer (13), and bolt (14).

NOTE

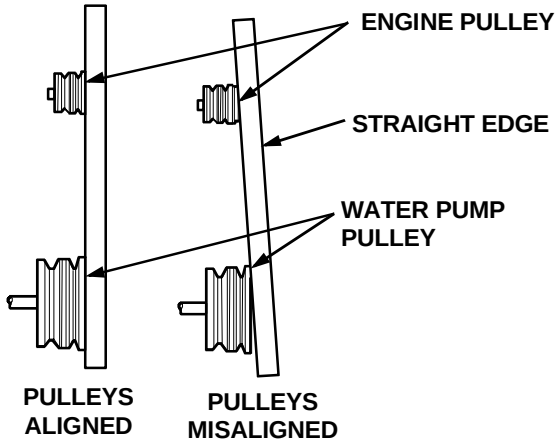
If belt alignment appears questionable, check alignment with straight edge as shown in diagram. Loosen bolts (10) and shift pump to align with pulley.

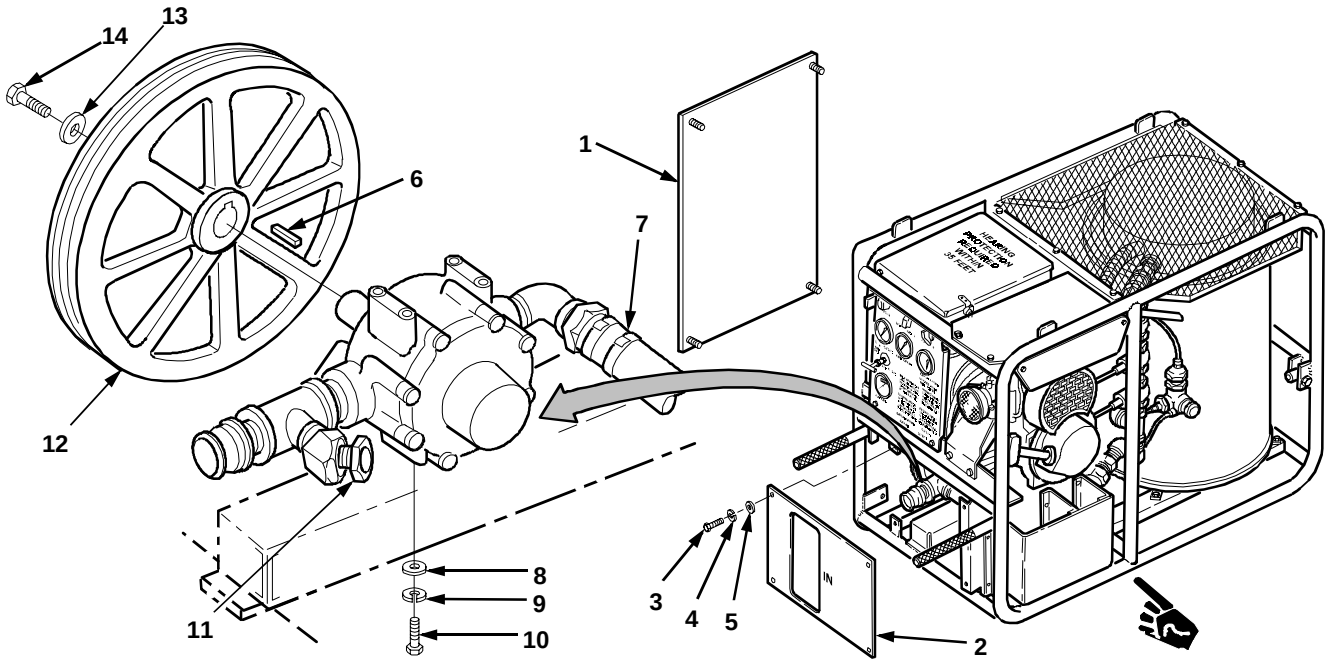
(c) Connect hose assembly (7) to coil inlet assembly at swivel and connect return hose from coil inlet assembly to 45° elbow (11) on water inlet assembly.

(d) Install and adjust belts (page 2-26).

(e) Reinstall panel (2) with four screws (3), lockwashers (4), and washers (5).

(f) Reinstall drive side panel (1).





b. Repair

Repair consists of cleaning (disassembly of pump and removal of debris), and replacement of hose assembly and coupling (15).

(1) Replacement of hose assembly and coupling

(a) Remove bolts (3), lockwashers (4), washers (5), and panel (2).

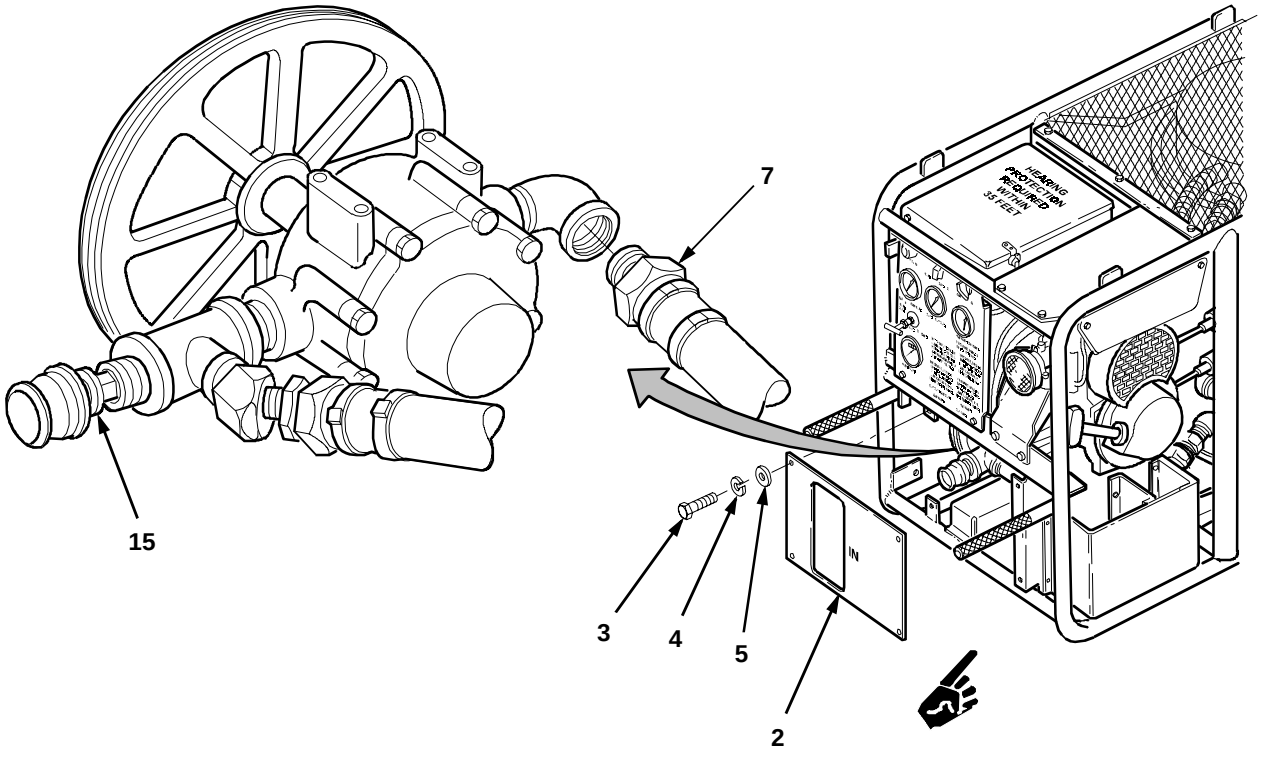
(b) Disconnect hose (7) at coil inlet assembly swivel.

(c) Disconnect hose (7) at pump assembly only if damaged and remove.

(d) Disconnect coupling (15) at pump and remove. Install replacement coupling using pipe sealant (item 18, App D).

(e) Install replacement hose (7) between coil inlet assembly and water pump with pipe sealant (item 18, App D).

(f) Replace cover (2) with screws (3), lockwashers (4) and washers (5).



2-25. WATER INLET ASSEMBLY MAINTENANCE - Continued

(2) Cleaning

NOTE

Cleaning procedure can be performed with pump in place.

The four bolts (21) at bottom and top of pump are longer than the four side bolts. When removing bolts, note bolt position to aid in installation.

(a) Position unit on end with heat exchanger down if pump is to be cleaned in place.

(b) Remove eight bolts (21) and plastic plug (23) in center of gap.

(c) Thread one long bolt into threaded hole (22) and tighten until cover (20) breaks free of pump housing (16).

(d) Remove cover (20) from pump housing (16) and o-ring (19) from cover (20). Remove bolt from threaded center hole.

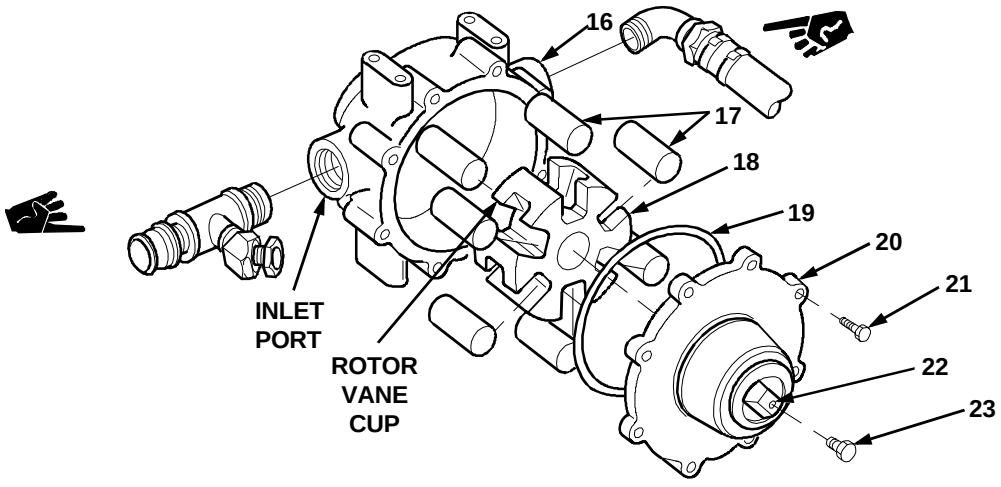
NOTE

Prior to removing rotor (18), note position of rotor vane cups.

(e) Remove rollers (17) from housing (16), if necessary also remove rotor (18). Clean mud, silt, and contaminants from pump lid (20), housing (16), rotor (18), and rollers (17) with fresh, clean water. Rotate pulley and check for binding. Examine inner case and lid for scoring. If scoring is severe, use a bench stone, Item 22, App D, to smooth surfaces. Examine rollers (17) for cracks or fractures. Reinstall rotor (18), if removed, and rollers (17).

(f) Position o-ring (19) on pump lid (20). Install pump cover on pump housing (16) with bolts (21) (long bolts on top and bottom and short bolts in side of pump). Cross tighten bolts (21) so that pump cover is drawn evenly. Replace plastic plug (23).

(g) Operate unit and check for leaks.



2-26. BURNER ASSEMBLY MAINTENANCE

This task includes:
- **a. Service**
- **b. Replace**
  - **(1) Removal and Disassembly**
  - **(2) Cleaning and Inspection**
  - **(3) Assembly and Installation**

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)

Materials Required:
Brush, Varnish (Item 4, App D)
Cleaning Solvent (Item 21, App D)
Tags (Item 25, App D)

Equipment Condition:
Engine shut down and cold

a. Service

(1) Remove burner assembly (page 2-80, steps (1)(a) through (1)(d)).

(2) Check igniter plug (1) for corrosion, cracked insulation, burned electrode and other physical defects.

(3) Remove three bolts (7), washers (5), lockwashers (6) and access cover (8) to gain access to fuel nozzles (9) and (10).

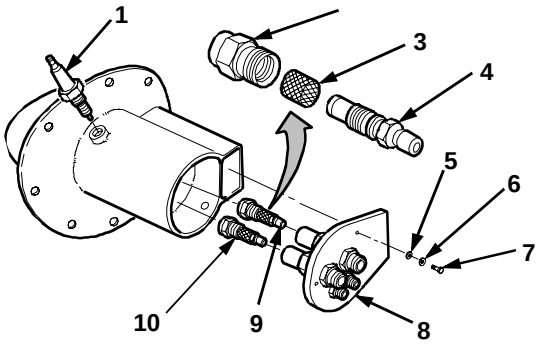
NOTE

When disassembling nozzles, do not interchange parts. Be sure to observe cleanliness.

(4) Remove nozzles (9 and 10) from burner nozzle holder assembly and disassemble into their components: screen (3), nozzle (4) and tip (2). Wash in cleaning solvent.

(5) Reassemble nozzles (9 and 10) and install on burner nozzle holder assembly. Nozzle (10) bears markings 6.00, 60°BPS on tip and nozzle (9) is marked 4.00, 30°BPS.

(6) Position plate (8) on burner and install three bolts (7), washers (5) and lockwashers (6).



2-26. BURNER ASSEMBLY MAINTENANCE - Continued

a. Service - Continued

NOTE

Prior to installing burner assembly refer to page 2-80, para b(3) for proper alignment of nozzles in burner housing.

(7) Reinstall burner assembly (page 2-81, steps (3) (d) through (3) (g)).

b. Replace

(1) Removal and Disassembly

(a) Tag and disconnect hose assemblies (15) from burner assembly.

(b) Tag and disconnect check valves (16).

(c) Disconnect voltage tripler plug wire (18) from igniter plug (1) and remove igniter plug.

(d) Remove eight bolts (14), lockwashers (13), washers (12) and voltage tripler ground wire (17).

(e) Remove three bolts (8), lockwashers (7), washers (6) and access cover (5).

(f) Remove four nuts (9) and burner nozzle holder assemblies (3).

(g) Remove two nuts (4) from burner nozzle holder assemblies (3).

(h) Remove nozzles (2 and 10) from burner nozzle holder assemblies (3).

(2) Cleaning and Inspection

(a) Clean all components with cleaning solvent and brush. (Nozzles should be disassembled, see page 2-79. Do not interchange parts.)

(b) Inspect igniter plug (1) for burned electrode, cracks or stripped threads.

(c) Inspect all other components for physical damage and/or stripped threads. Discard defective components.

(3) Assembly and Installation

CAUTION

Make sure nozzles are installed correctly. Nozzle (2) bears markings "4.00, 30°BPS" and nozzle (10) is marked "6.00, 60°BPS."

(a) Install nozzle (2) on burner nozzle holder assembly (3) and install assembly on access cover (5) with nut (4) and two nuts (9). Ensure burner nozzle holder assembly is installed perpendicular to the access cover surface.

(b) Install nozzle (10) on burner nozzle holder assembly (3) and install assembly on access cover (5) with nut (4) and two nuts (9).

(c) Install access cover (5), with assembled components, on burner housing (11) with three bolts (8), lockwashers (7) and washers (6).

NOTE

Nozzles must be centered in burner housing ports as shown. If realignment is necessary, loosen bolts (8) and shift access cover (5) until nozzles are centered in ports. Retighten bolts (8).

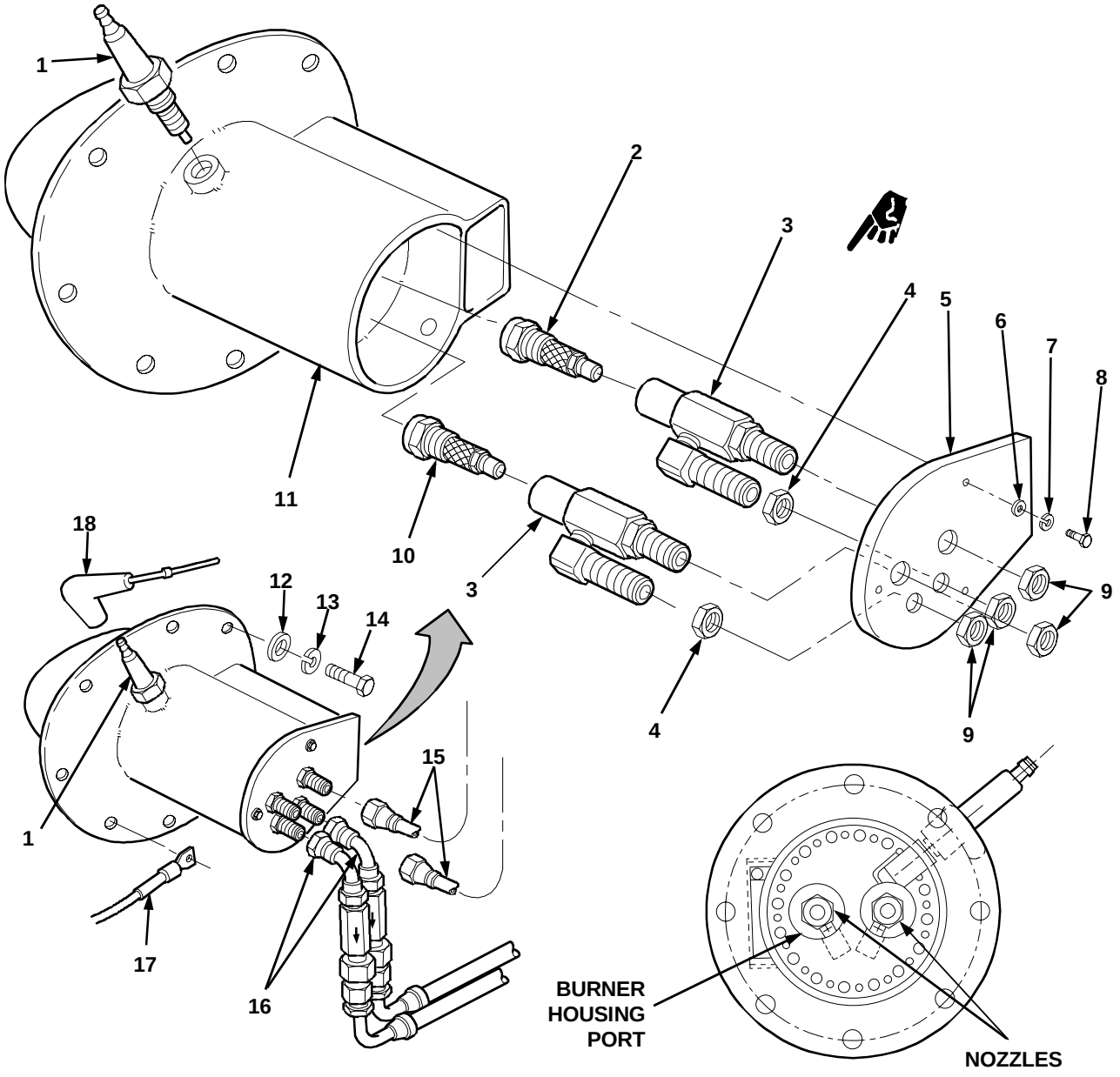
(d) Connect voltage tripler ground wire (17) and install assembled burner assembly on heat exchanger with eight bolts (14), lockwashers (13) and washers (12).

(e) Connect check valves (16) to burner assembly as tagged.

(f) Connect hose assemblies (15) to burner assembly as tagged.

(g) Install igniter plug (1).

(h) Connect voltage tripler plug wire (18) to igniter plug (1).



2-27. HEAT EXCHANGER MAINTENANCE

This task includes: **Service (Descaling)**

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)

Materials Required:
Brush, Varnish (Item 4, App D)
Cleaning Solvent (Item 21, App D)
Polyurethane Coating (Item 15, App D)
Garbage Can, 32 gallon (2 each) or equivalent (TM 3-4230-228-10)
55 Gallon Drum (1 each) (Item 9, App D)
Sodium Carbonate (Soda Ash) (Item 19, App D)
Sulfamic Acid (Item 24, App D)

Equipment Condition:
Engine shut down and cold

Service (Descaling)

NOTE

Descaling is necessary when scale deposit of 1/16 inch or more has accumulated on interior surfaces of coil assembly, outlet assembly, branch and pressure hose assemblies, showers and wands. Deposit should be checked at the outlet assembly (page 2-7) or at the branch hose strainer (page 2-90).

a. Move decontaminating apparatus, to be descaled, to the designated area.

b. Position two garbage cans and one 55 gallon descaling drum approximately 20 to 30 feet from intake end of decontaminating apparatus.

c. Connect suction hose and place strainer end in bottom of descaling drum. Secure in position.

d. Connect branch hose assembly to outlet assembly. Do not remove strainer.

e. Connect two pressure hoses to branch hose assembly.

f. Place discharge ends of each pressure hose in descaling drum.

g. Fill 55-gallon descaling drum with 30 gallons of water and each of the 32-gallon cans with 25 gallons of water.

h. Start decontaminating apparatus and establish a water flow (FUNCTION SELECTOR in OFF position).

i. Position pressure hoses so they do not interfere with inlet to suction strainer.

j. Turn FUNCTION SELECTOR to WANDS while holding OVERRIDE switch to ON position until water temperature in 55 gallon drum is approximately 35-40° C (85-100ºF). (Low pressure in system, caused by disconnected output devices will prevent burner from igniting unless OVERRIDE switch is activated).

WARNING

Chemicals used in descaling process are irritating to the skin and eyes. Wear protective clothing and goggles and exercise care when handling chemicals.

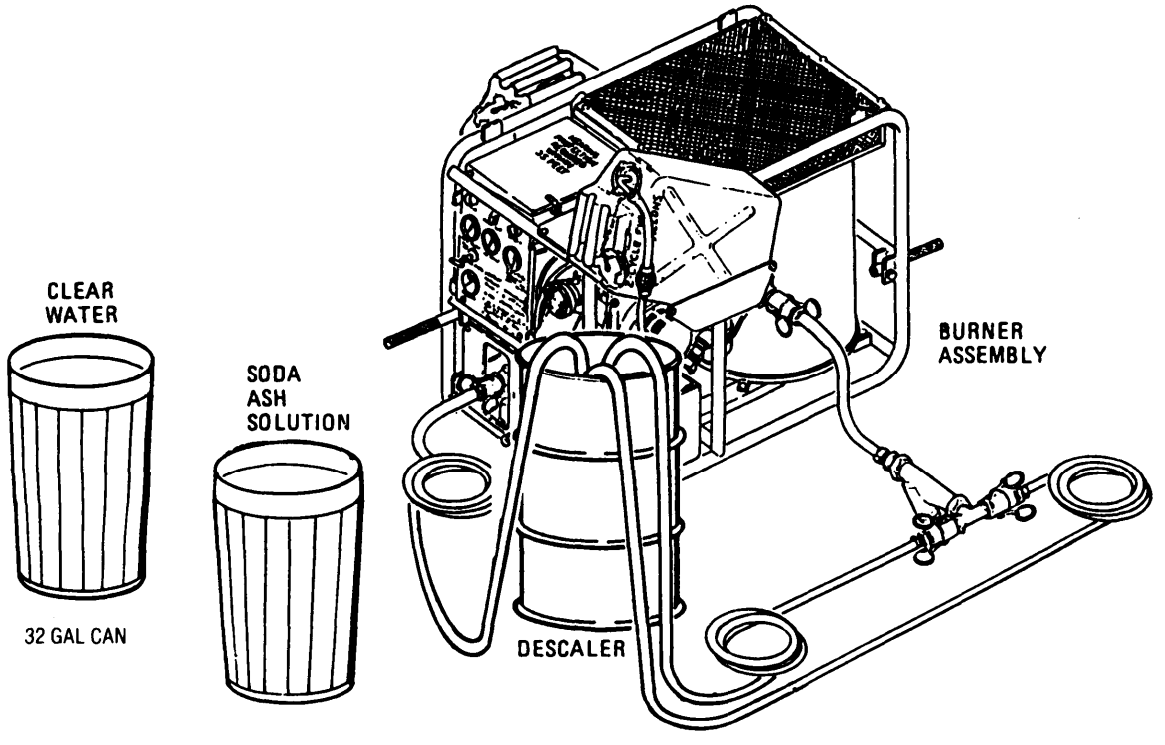
k. Slowly mix 15 lb (approximately one level gallon can) of sulfamic acid with the 30 gallons of warm water in the drum.

l. Maintain the solution within a temperature range of 35-40ºC (85-100ºF) using OVERRIDE switch. Operate decontaminating apparatus for approximately 90 minutes.

CAUTION

Lift suction hose assembly occasionally to make sure that no blockage has occurred

m. Before the end of the 90 minute recirculation period, prepare the sodium carbonate solution by mixing 12 pounds (one gallon can) of sodium carbonate with 25 gallons of water in one of the 32 gallon cans.



2-27. HEAT EXCHANGER MAINTENANCE - Continued

n. When the circulation period is over, throttle engine back until the water pump stops, then transfer the suction hose into the sodium carbonate solution. Return engine throttle to MAX position and lift out pressure hoses to observe flow.

o. When all descaler is pumped out, as seen by a brief stop of flow from pressure hoses and change of color, transfer the pressure hoses into the sodium carbonate solution container and circulate the solution for several more minutes (FUNCTION SELECTOR in OFF position). Do not press OVERRIDE switch.

p. Throttle engine back until water pump stops then transfer suction hose to the second 32 gallon can; fill with clear water. Return throttle to full power and lift out pressure hoses to observe flow.

q. When the sodium carbonate solution, remaining in the the system, is completely pumped out, as seen by a change of color and a brief stop of flow from the pressure hoses, transfer the high pressure hoses to the clear water can and operate system for an additional 5 minutes (FUNCTION SWITCH in OFF position). Do not press OVERRIDE switch.

r. Shut down unit and inspect for scale in outlet assembly and branch hose strainer.

s. If descaling is not adequate, repeat steps a through s.

t. When entire descaling procedure is completed, slowly add the sodium carbonate solution to the descaling solution. The descaling solution will froth and foam as the sodium carbonate solution is added and will neutralize.

u. When solution is completely neutralized, dispose of solution in accordance with local SOP.

2-28. FRAME MAINTENANCE

This task includes:
a. Repair (Replacement of Handles)
b. Repair/Replacement of Fuel Can Rack
c. Repair/Replacement of Storage Box

INITIAL SETUP:

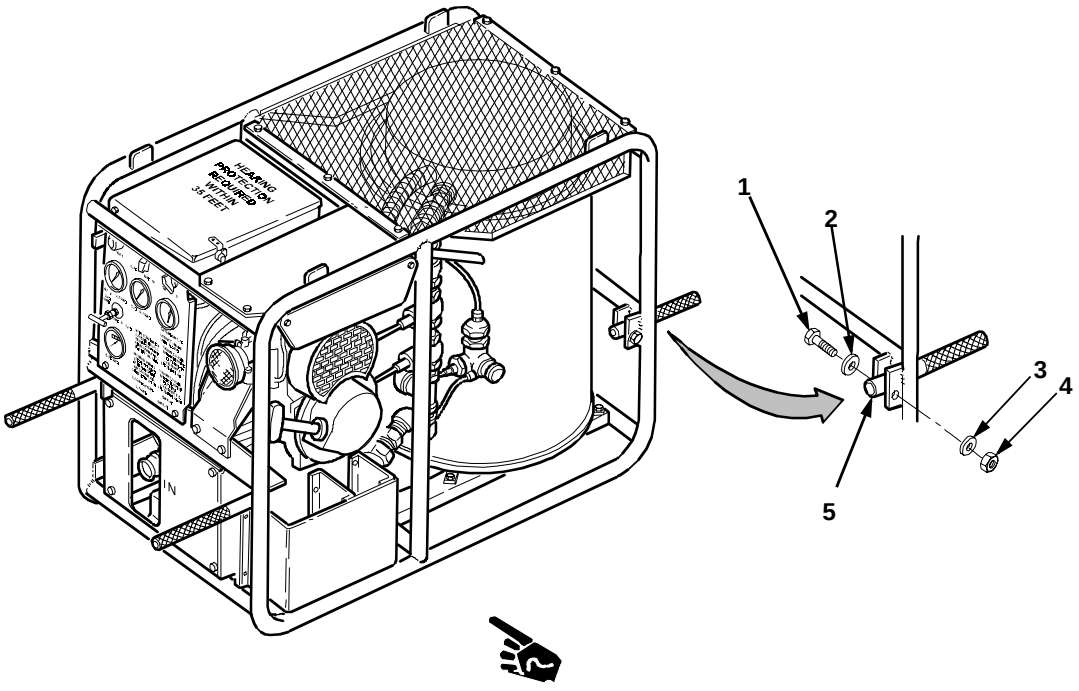
Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)

Equipment Condition:
Engine shut down and cold

a. Repair (Replacement of Handles)

(1) Remove nut (4), bolt (1), washers (2 and 3), and handle (5). There are four handles on the M17.

(2) Position replacement handle on frame and secure with bolt (1), washers (2 and 3), and nut (4).



2-28. FRAME MAINTENANCE - Continued

b. Repair/Replacement of Fuel Can Rack

(1) Remove two bolts (4) and washers (3). Slide right side of rack (2) out, pivot down on frame and remove rack from frame.

(2) Remove tubes (1).

(3) Clean all parts (including mounting surfaces) with cleaning solvent and inspect for serviceability. Discard unserviceable parts.

(4) Position tubes (1) and rack (2) on frame and install two washers (3) and bolts (4).

c. Repair/Replacement of Storage Box

(1) Remove two nuts (5), washers (6), spacers (7), and bolt (8).

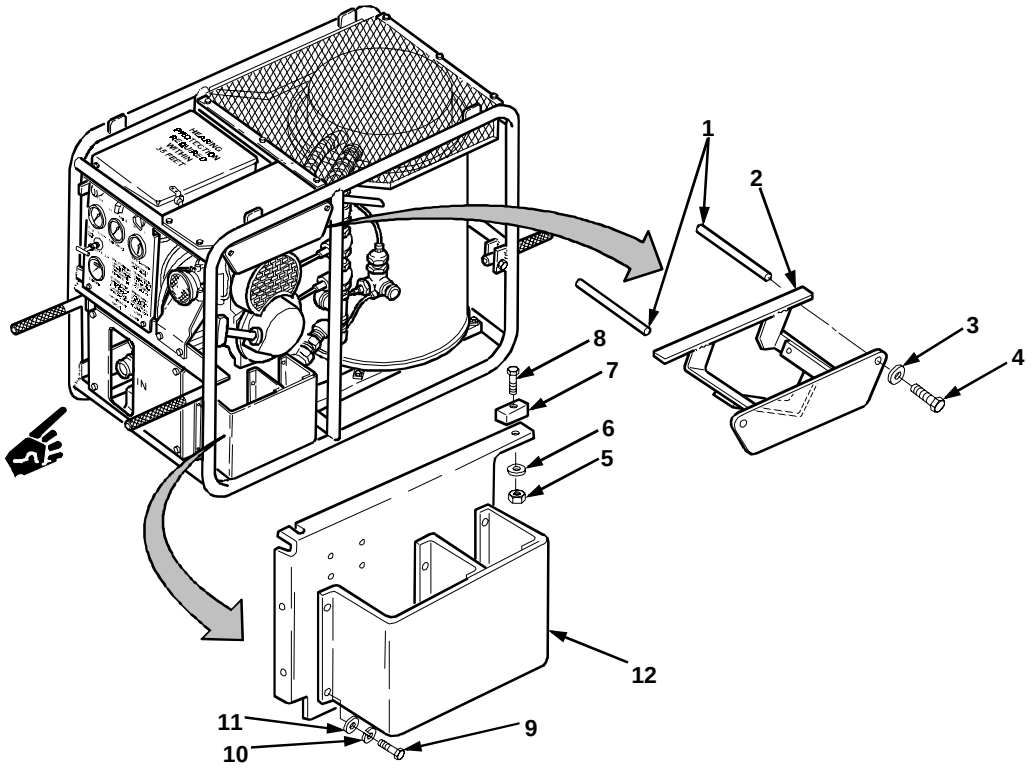
(2) Remove three bolts (9), lockwasher (10), and washers (11).

(3) Remove storage box (12) from frame.

(4) Clean all parts including mounting surfaces with solvent and inspect for serviceability. Replace if unserviceable.

(5) Position storage box (12) in frame and secure with three bolts (9), washers (10), and washers (11).

(6) Service top portion of box with two bolts (8), washers (6), and nuts (5), making sure spacers are in place between frame and top lip of box.



2-29. SUCTION HOSE ASSEMBLY MAINTENANCE

This task includes: **a. Replace**
b. Repair
(1) Disassembly
(2) Assembly

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)

Equipment Condition:
Suction hose assembly removed from unit

a. Replace

Suction hose shall be replaced if hose (3) is unserviceable.

b. Repair

NOTE

If removal of coupling/stringer is required, it may be necessary to cut off a section of hose just beyond coupler end, approximately 2 inches in length.

(1) Disassembly

(a) Remove gasket (6).

(b) Loosen nut (4), slide clamp (7) back and remove coupling (5) from hose (3).

(c) Remove clamp (7).

(d) Loosen nut (2) and remove strainer assembly (1).

(e) Remove clamp (8).

(f) Clean all parts with water and inspect for serviceability. Discard unserviceable items.

(2) Assembly

NOTE

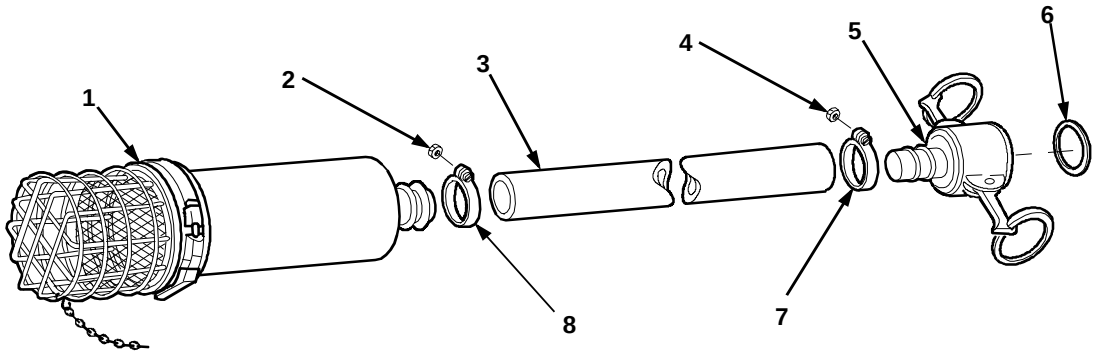
If clamps (8 and 7) are replaced, clamp nut, delivered with clamps, shall be discarded and replaced with nut (item 3, figure C-48, App C.)

(a) Position clamps (8) and (7) on replacement hose (3).

(b) Install strainer assembly (1) and tighten nut (2).

(c) Install coupling (5) and tighten nut (4).

(d) Install gasket (6).



2-30. SUCTION HOSE STRAINER ASSEMBLY MAINTENANCE

This task includes:
- **a. Replace**
- **b. Repair**
  - **(1) Disassembly**
  - **(2) Assembly**

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)

Equipment Condition:
Suction hose assembly removed from decontaminating apparatus

a. Replace

Suction hose strainer assembly shall be replaced if shroud (3) is unserviceable.

b. Repair

(1) Disassembly

(a) Unlatch clamp (2) and remove basket (1), clamp (2), and strainer (10) from shroud (3).

(b) Unscrew retainer (4) and remove gaskets (5 and 7) and filter element (6).

(c) Remove filter mount (8) by unscrewing it from strainer (10).

(d) Remove hook (12) and chain (11).

(e) Remove gasket (9) from strainer (10).

(f) Clean all parts to be retained with clear water and inspect for serviceability. Discard unserviceable items.

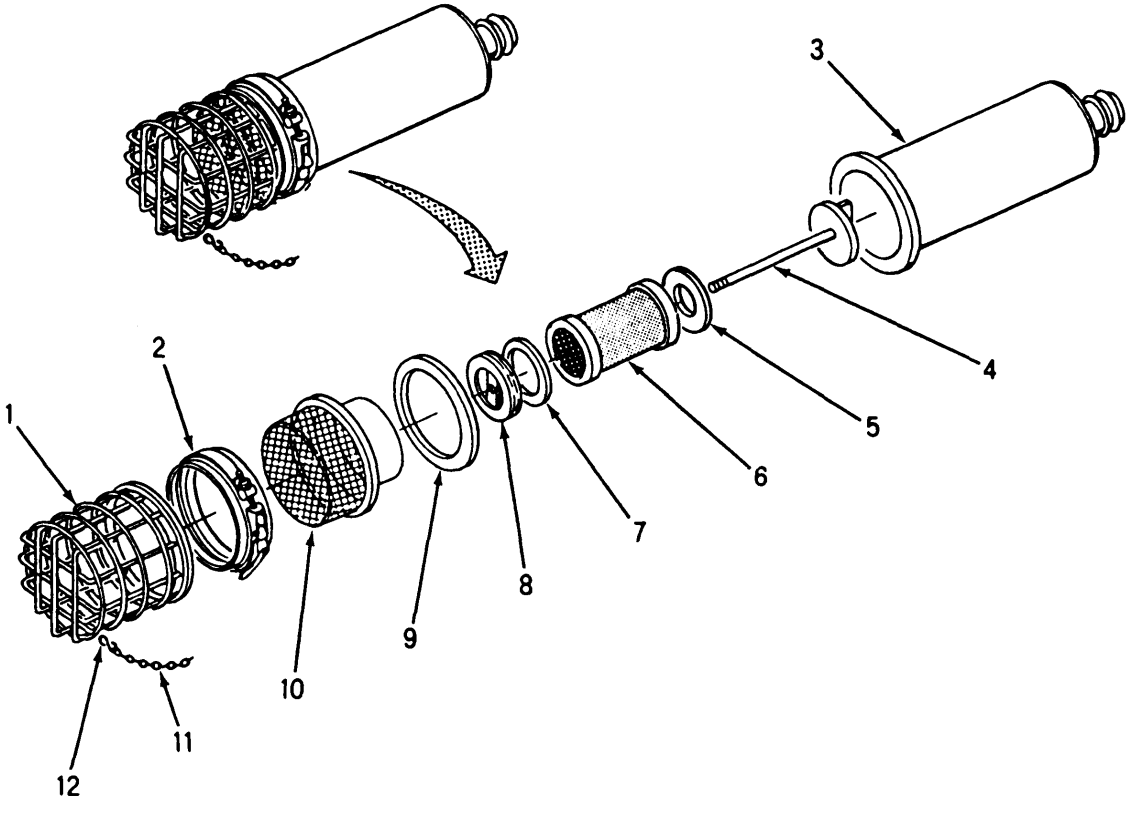
(2) Assembly

(a) Assemble filter element (6) and gaskets (5 and 7) on filter mount (8). Be sure open end of filter points toward mount. Secure with retainer (4).

(b) Screw parts assembled above into strainer (10).

(c) Position strainer (10), gasket (9) and basket (1) on shroud (3), and secure with clamp (2).

(d) Install chain (11) with hook (12).



2-31. BRANCH HOSE ASSEMBLY MAINTENANCE

This task includes: **a. Replace**
b. Repair
(1) Disassembly
(2) Assembly

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-90-N26)

Equipment Condition:
Branch hose assembly removed

a. Replace

Branch hose assembly shall be replaced if either the hose or strainer body (8) is unserviceable.

b. Repair

(1) Disassembly

(a) Remove gaskets (1) and (2).

(b) Remove cap (5).

(c) Remove o-ring (4) and sediment strainer element (3).

(d) If necessary, remove screw (6) and lanyard (7).

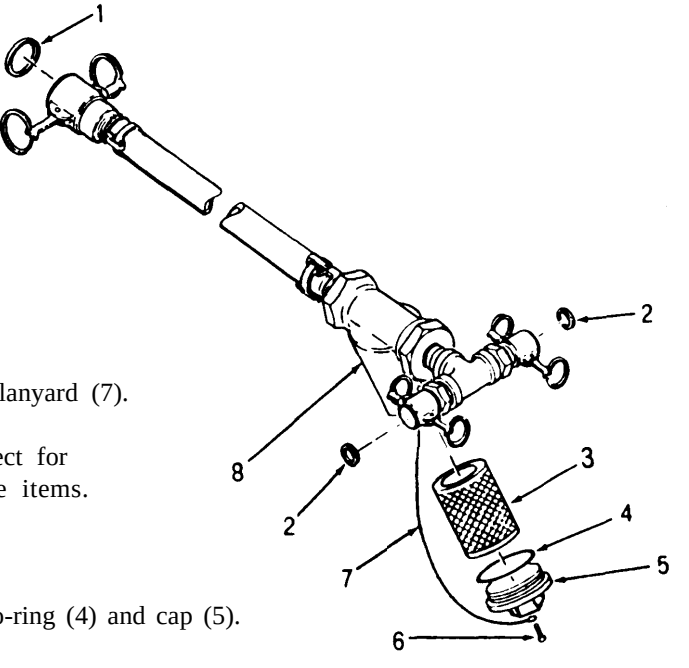
(e) Clean all parts with water and inspect for serviceability. Discard unserviceable items.

(2) Assembly

(a) Install sediment strainer element (3), o-ring (4) and cap (5).

(b) Install lanyard (7) with screw (6).

(c) Install gaskets (1) and (2).



2-32. PRESSURE HOSE ASSEMBLY MAINTENANCE

This task includes: **a. Replace**
b. Repair

INITIAL SET UP:

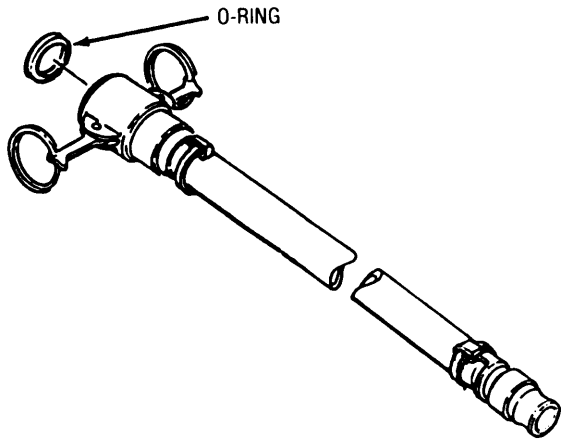
Equipment Condition:
Engine shut down and cold.

a. Replace

Replace pressure hose assembly if hose section or couplings are unserviceable.

b. Repair

Repair of hose assembly is limited to replacement of o-ring.



2-33. SHOWERS ASSEMBLY MAINTENANCE

This task includes: **a. Replace**
b. Repair
(1) Disassembly
(2) Assembly

INITIAL SET UP

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-90-N26)

Materials Required:
Locking Compound (Item 6, Appendix D)

Equipment Condition:
Showers removed from decontaminating apparatus

a. Replace

Replace individual shower sections if tubes and couplings (except items 9 and 10) are unserviceable.

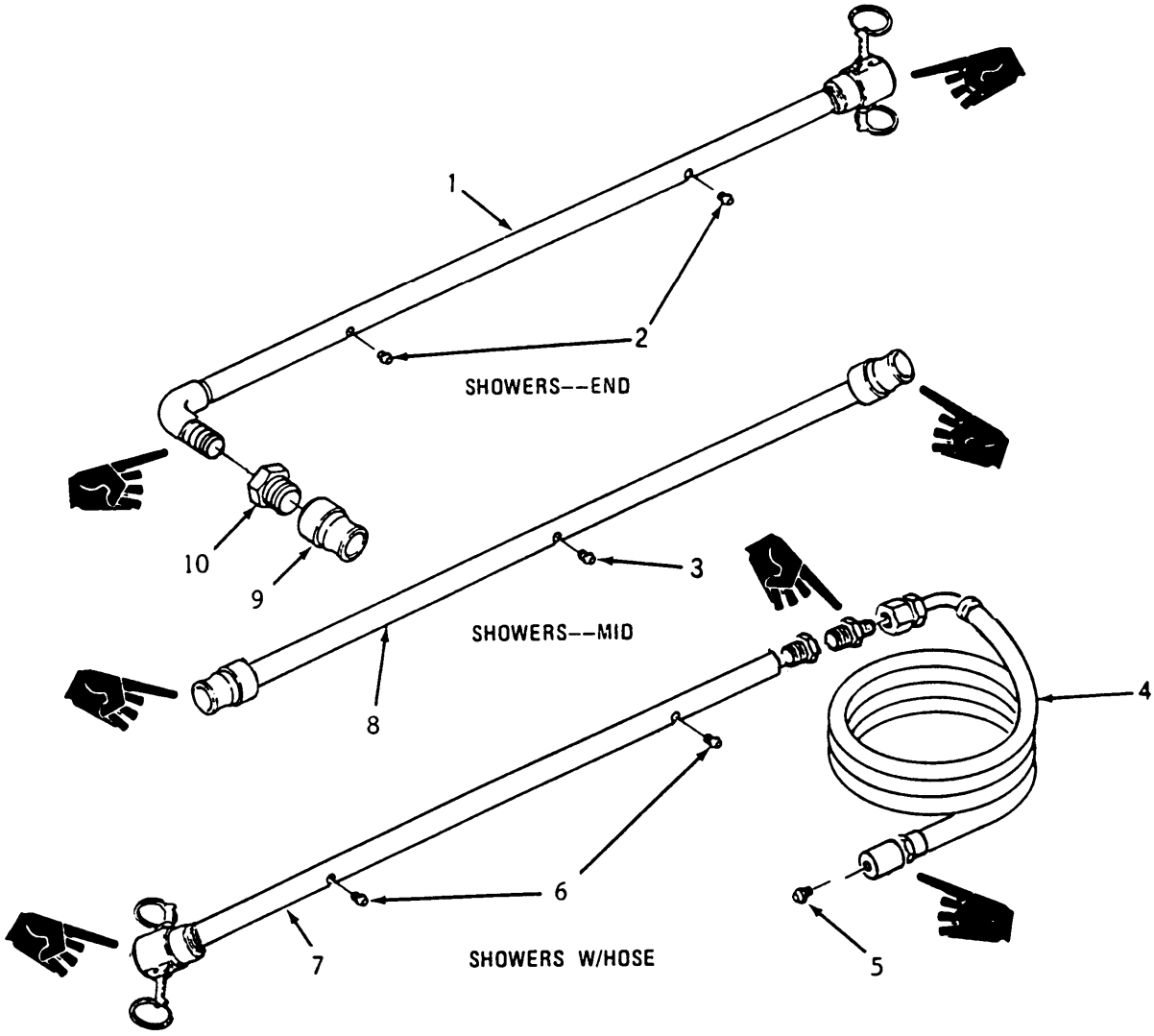
b. Repair

(1) Disassembly

(a) Remove shower jets (2, 3, 7 and 6) from tubes (1, 9 and 8) and hose assembly (4).

(b) Remove coupling half (10) and reducer (11) from pipe (1).

(c) Clean all parts with water and inspect for serviceability. Discard unserviceable items.



(2) Assembly.

NOTE

When assembling shower sections, use locking compound to install jets, couplings and fittings.

(a) Install reducer (10) and coupling half (9) on pipe (1).

(b) Install jets (2) on pipe (1).

(c) Install jet (3) on pipe (8).

(d) Install hose assembly (4) on pipe (8).

(e) Install jets (6) on pipe (7).

(f) Install jet (5) in hose assembly (4).

2-34. SPRAY WANDS MAINTENANCE

This task includes: **a. Replace**
b. Repair
(1) Disassembly
(2) Assembly

INITIAL SET UP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-90-N26)

Materials Required:
Locking Compound (Item 6, Appendix D)

Equipment Condition:
Spray wands disconnected from decontaminating apparatus.

a. Replace

Replace spray wand if spray gun (14) is unserviceable.

b. Repair

(1) Disassembly

(a) Unlatch clamp (8) and pull back plastic sleeve, away from spray gun.

(b) Unscrew nipple (10), swivel (13), reducer (12) and coupling (11) from spray gun (14) as an assembly.

(c) Remove sleeve (9) and clamp (8).

(d) Remove coupling (11).

(e) Remove reducer (12) and nipple (10) from swivel.

(f) Remove nozzle (5), washers (2 and 4) and disk (3).

(g) Remove adapter (6), plastic tube (7) and pipe (1)

(2) Assembly

NOTE

When assembling spray wand, use locking compound on all threaded connections.

(a) Install nipple (10) and reducer (12) on swivel (13).

(b) Install coupling (11) on reducer (12).

(c) Install assembled components on spray gun (14).

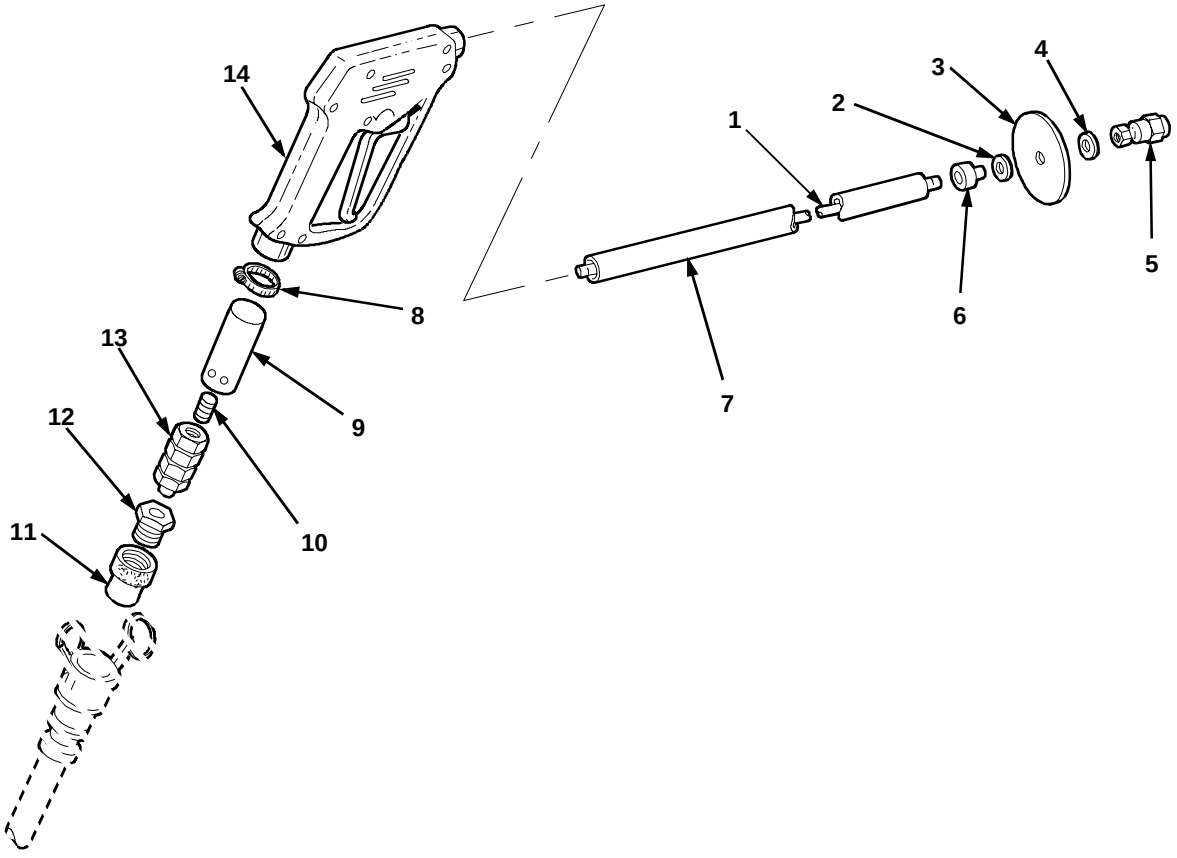
(d) Install sleeve (9) with holes toward coupling end and secure with clamp (8).

(e) Install pipe (1) on spray gun (14) and position plastic tube (7) over pipe.

(f) Install adapter (6).

(g) Position washers (2 and 4) and disk (3) on pipe as shown.

(h) Install nozzle (5).



2-35. INJECTOR ASSEMBLY MAINTENANCE

This task includes: **a. Replace**
b. Repair
(1) Disassembly
(2) Assembly

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)

Materials Required:
Locking Compound (Item 6, App D)

Equipment Condition:
Injector assembly removed from unit

---

a. Replace

Replace injector assembly if syphon injector (9) is unserviceable.

b. Repair

(1) Disassembly

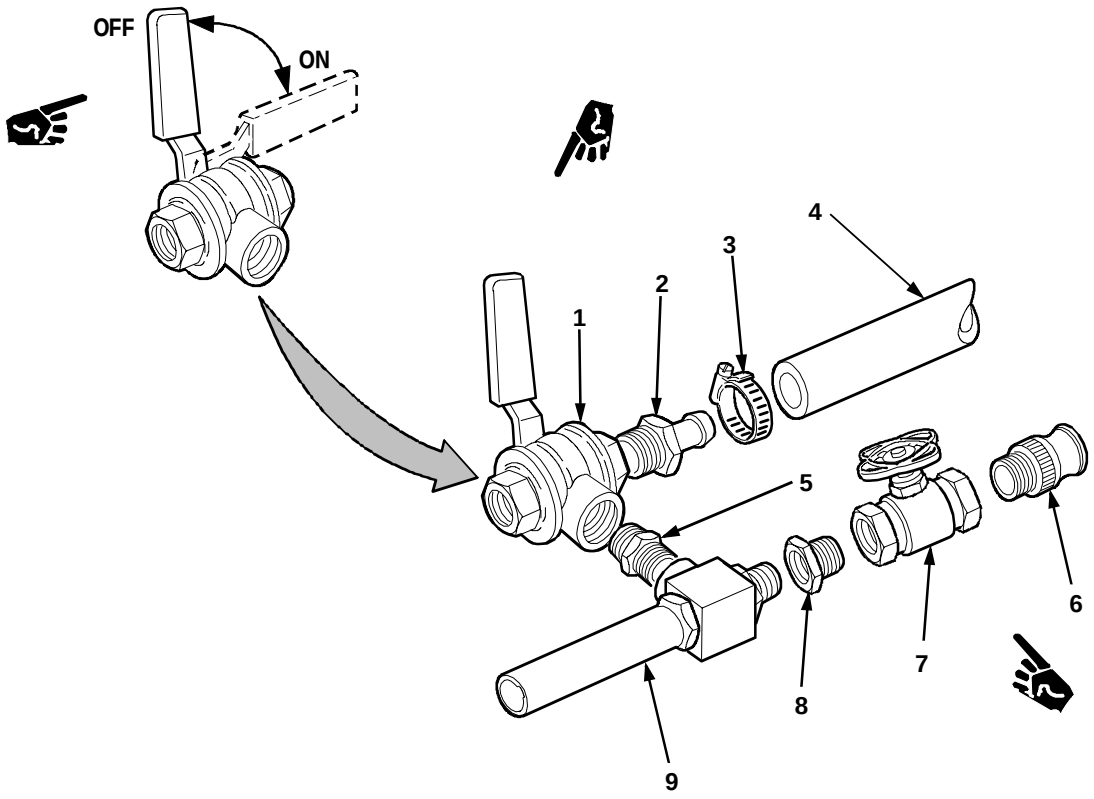
(a) Loosen hose clamp (3) and remove tubing (4) and hose clamp (3).

(b) Remove syphon injector (9) from pipe reducer (5).

(c) Remove gate valve (7), coupling half (6) and adapter (8) from syphon injector (9).

(d) Remove adapter (2) and pipe reducer (5) from ball valve (1).

(e) Clean all components with water and inspect for serviceability. Discard unserviceable components.



(2) Assembly

NOTE

All male threads shall be treated with thread locking compound at assembly.

(a) Position ball valve so that control handle can move in an arc above ball valve.

(b) Install adapter (2) and pipe reducer (5) on ball valve (1).

(c) Install syphon injector (9) on pipe reducer (5) as shown.

(d) Install adapter (8), gate valve (7) and coupling half (6) on syphon injector (9).

(e) Install tubing (4) on adapter (2) and secure with hose clamp (3).

2-36. ACCESSORY BOX MAINTENANCE

This task includes:
a. Replace
b. Repair
(1) Disassembly
(2) Assembly

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)
Riveter, Blind, Hand (Item 9, Page B-7)

Materials Required:
Brush, Varnish (Item 4, App D)
Cleaning Solvent (Item 21, App D)

Equipment Condition:
Accessory box empty

a. Replace

Replace accessory box if bottom weldment (11) is unserviceable.

b. Repair

(1) Disassembly

(a) Remove two rivets (1) and catch (2) using a cold chisel.

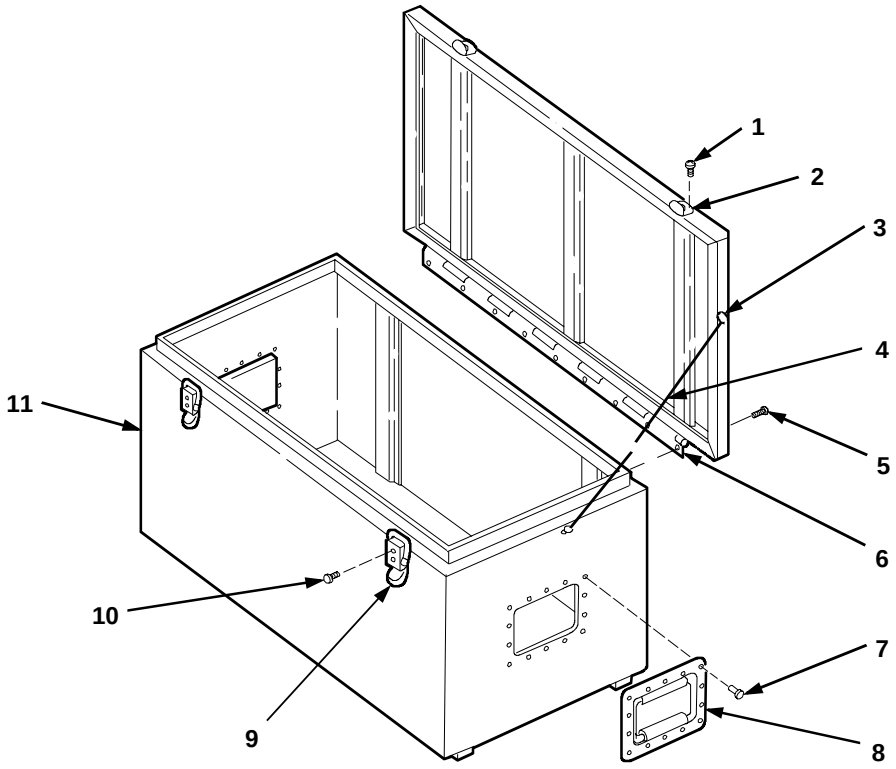
(b) Remove nine rivets (5) and hinge (6).

(c) Remove two rivets (10) and latch assembly (9).

(d) Remove fourteen rivets (7) and handle assembly (8).

(e) Remove retaining rings (3) and chain (4).

(f) Clean all parts with cleaning solvent and brush and inspect for serviceability. Discard all unserviceable components.



(2) Assembly

(a) Install latch assembly (9) with two rivets (10), using hand riveter.

(b) Install retaining rings (3) and chain (4).

(c) Install latch (2) with two rivets (1).

(d) Install hinge (6) with nine rivets (5).

(e) Install handle (8) with fourteen rivets (7).

All data in paragraph 2-37, pages 2-100 and 2-101 deleted.

2-38. TOOL KIT MAINTENANCE

This task includes: **Repair**

INITIAL SETUP:

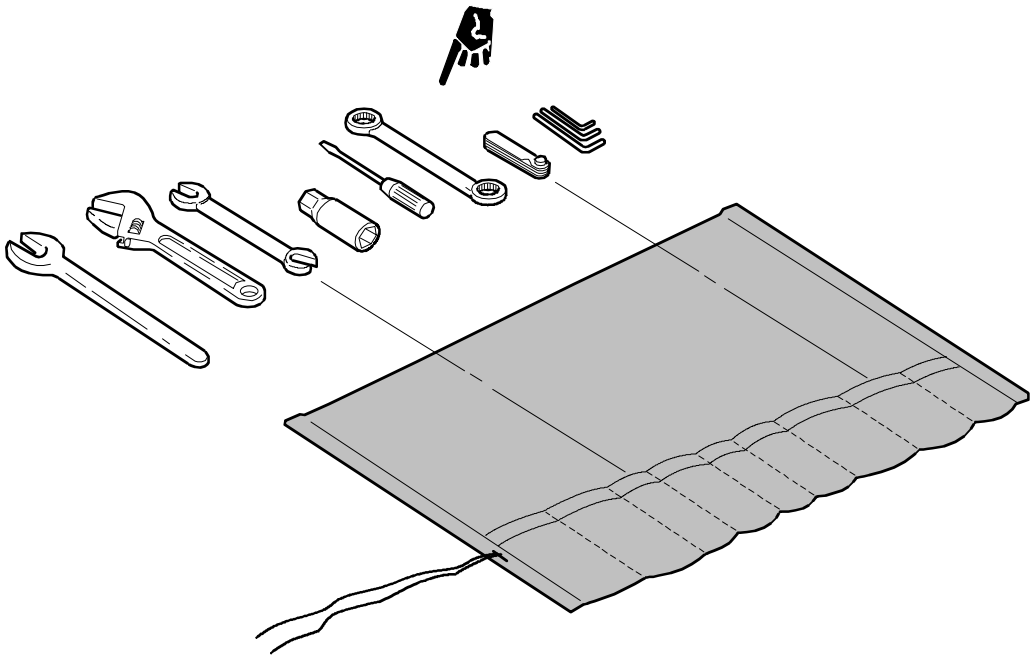
Equipment Condition:
Tools removed from accessory box

Repair

Repair consists of replacing damaged or missing items in the tool kit.

NOTE

Appendix C (page C-60) of this manual provides detailed information about each tool.



Section V. PREPARATION FOR STORAGE OR SHIPMENT

	Page		Page
Preparation for Long Term Storage or Shipment	2-103	In Administrative Storage Inspection	2-107
Preparation for Administrative Storage	2-107	Removal from Administrative Storage	2-107

2-39. PREPARATION FOR LONG TERM STORAGE OR SHIPMENT

a. Perform all outstanding PMCS procedures.

b. If freezing temperatures are expected, perform "Shutdown in Freezing Weather" procedure (TM 3-4230-228-10, steps 1 through 19).

c. Remove fuel pump and water pump belts (page 2-26). Place all belts in tool box.

d. Prepare engine for long term storage as follows:

(1) Prepare a separate fuel mixture, consisting of 3 parts gasoline and 1 part preservative oil (item 12, App D). Do not add mixture to engine fuel can at this time.

(2) Start and operate engine at idle speed until it has reached normal operating temperature.

(3) Shut down engine and replace engine fuel with preservative mixture prepared in step (1) above.

(4) Start engine and set throttle to half open position. Allow engine to operate for an additional five minutes.

(5) Stop engine and allow to cool. Remove engine spark plug from cylinder head.

(6) Remove carburetor float bowl and main jet (page 2-48). Using a clean rag, wipe bowl and jet until dry. Reinstall float bowl and main jet in carburetor.

(7) Pour approximately one tablespoon of undiluted preservative oil (Item 12, App D) through spark plug hole and into cylinder. Slowly pull engine starter handle several times.

(8) Pull starter until piston is positioned at approximately its highest point in the cylinder and reinstall spark plugs.

e. Remove fuel cans and drain fuel lines, fuel filter and fuel cans.

2-39. PREPARATION FOR LONG TERM STORAGE OR SHIPMENT - Continued

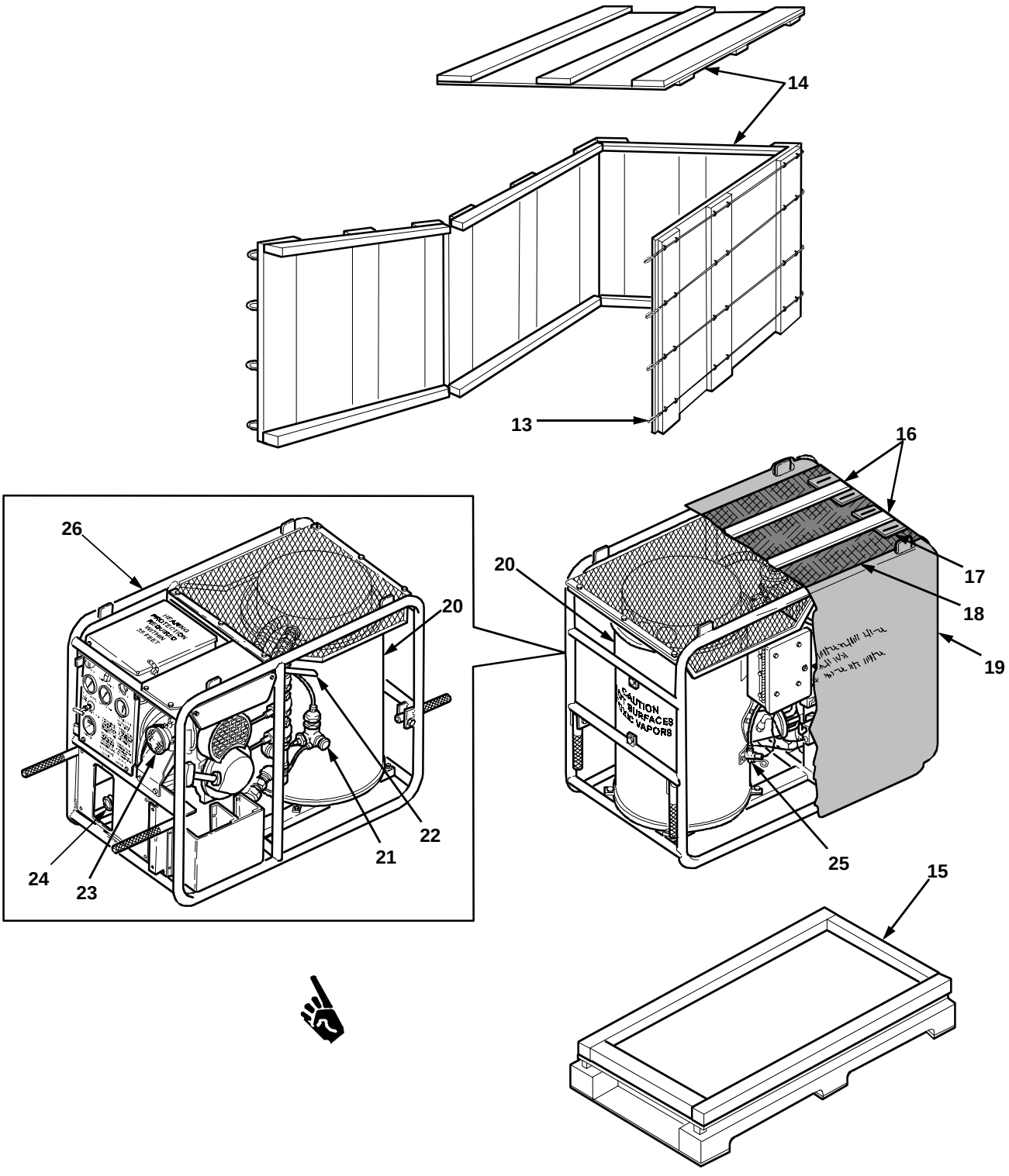
f. Using duct tape (item 26, App D), cover exhaust of heat exchanger (20), water inlet assembly (24), carburetor air filter (23), outlet assembly (21), pressure relief valve (22) and photocell tube (25).

CAUTION

If rinse down is required prior to shipment, use only fresh water to clean pump/heater assembly. NEVER USE SALTWATER.

g. Place pump/heater assembly (26) on base (15). Place dust cover (19), fiberboard cap (18), and four corner angles (17) over unit. Secure unit to base (15) with banding straps (16).

h. If unit is to be shipped, place pallet box (14) over unit, fasten binding wires (13) and secure pallet box (14) to unit with banding straps.


14
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CAUTION
SURFACES
VAPORS

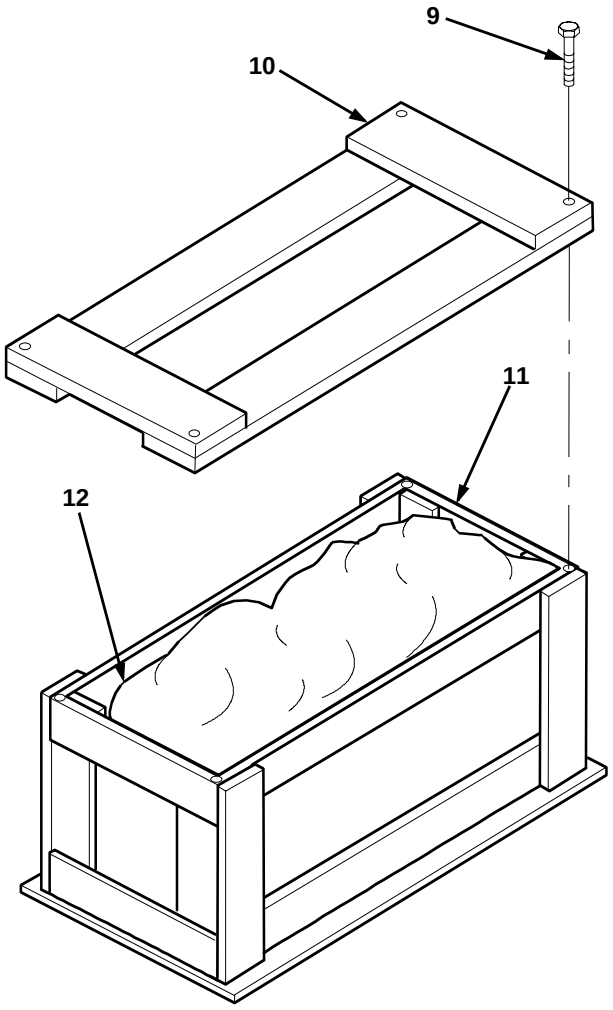
2-39. PREPARATION FOR LONG TERM STORAGE OR SHIPMENT - Continued

i. If water tank was used, drain and allow to dry.

NOTE

Refer to TM 10-5430-233-12&P for 3000-gallon water tank takedown instructions.

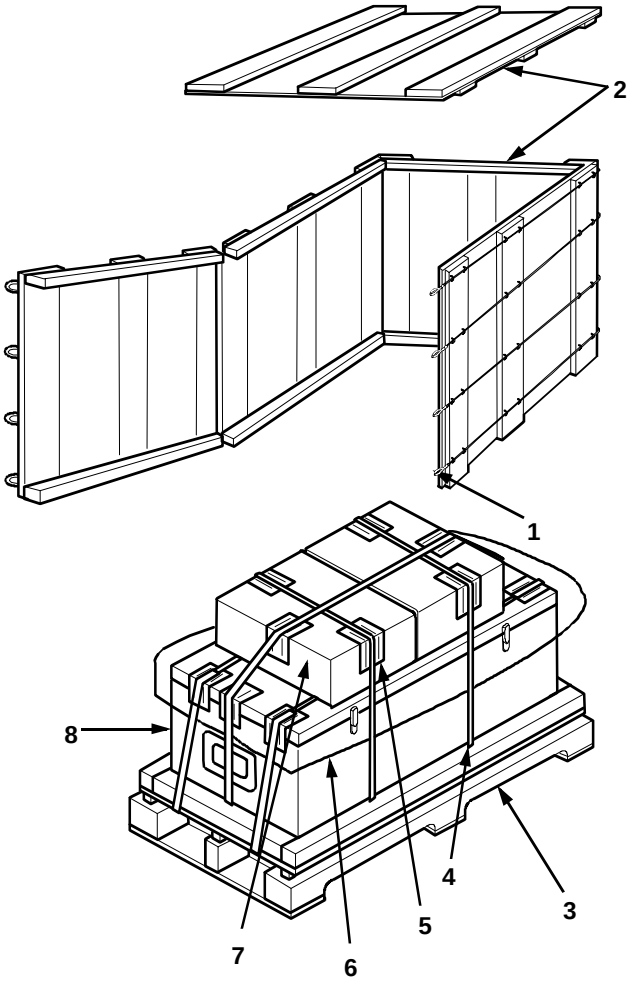
j. When water tank is completely dry, fold tank as shown in TM 3-4230-228-10. Place water tank (12) into water tank box (11). Secure lid (10) to water tank box (11) with lag bolts (9).



k. Store all accessories in accessory kit (8). Place accessory kit (8) on base (3). Place plastic sheet (6), two boxed fuel cans (7), and twelve corner angles (5). Secure to base (3) with banding straps (4).

l. If unit is to be shipped, place pallet box (2) over unit. Fasten binding wires (1) and secure pallet box (2) to unit with banding straps.

m. Refer to TM 3-4230-228-10 for tiedown procedures.



2-40. PREPARATION FOR ADMINISTRATIVE STORAGE

Preparation of this equipment for administrative storage shall be identical to that provided for long term storage or shipment (page 2-103).

2-41. IN ADMINISTRATIVE STORAGE INSPECTION

Perform monthly walk-around visual inspection of decontaminating apparatus. Inspect for corrosion or other deterioration and missing or damaged parts.

2-42. REMOVAL FROM ADMINISTRATIVE STORAGE

Removal from administrative storage shall consist of performing Service Upon Receipt procedures (page 2-1).

CHAPTER 3

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

Section I. Direct Support Maintenance Troubleshooting
Section II. Direct Support Maintenance Repair Procedures

Section I. DIRECT SUPPORT MAINTENANCE TROUBLESHOOTING

	Page		Page
Introductory Information	3-1	Troubleshooting Table	3-3
Symptom Index	3-2		

3-1. INTRODUCTORY INFORMATION

a. The Symptom Index lists the common malfunctions which you may find during the operation or maintenance of the Decontaminating Apparatus or its components. Look at the Malfunction List until you find the one that you are having, then go to the page listed and perform the troubleshooting test or inspections listed therein. The corrective action step will direct you to the proper paragraph for performing the corrective action.

b. This manual cannot list all malfunctions that may occur nor list all the tests or inspections and corrective actions. If a malfunction is not listed or it is not corrected by the listed corrective actions notify your supervisor.

c. Be sure to read All Warnings in the front of the manual before starting your maintenance.

d. The maintenance procedures in this manual are to be performed by personnel with MOS of 63J, Quartermaster and Chemical Equipment Repairer.

e. Troubleshooting of the M17 may require the system to be in operation. Read and be thoroughly familiar with the operating procedures and warnings which are found in your Operator's Manual, TM 3-4230-228-10, prior to working on your equipment.

3-2. SYMPTOM INDEX

Malfunction No	Malfunction	Page
19	Both jets on (only one wand activated)	3-18
13	Burner continues to operate	3-15
10	Burner cycles excessively	3-14
1	Deleted	
20	Engine fails to start or stops - 215cc engine	3-18.1
4	Excessive noise and vibration - 215cc engine	3-8
2	Engine operates erratically - 215cc engine	3-5
21	Engine runs roughly - 215cc engine	3-18.1
3	Engine overheats - 215cc engine	3-7
9	Low or erratic burner output	3-14
6	Low water flow - low pressure	3-9
8	No burner function - no ignition	3-11
15	No heating (showers only)	3-16
5	No water flow - no pressure	3-9
16	Reset lamp is off when burner fails to ignite	3-16
11	Temperature too high (showers)	3-15
12	Temperature too high (wands only)	3-15
17	Unable to reset at RESET pushbutton (automatic shutdown)	3-17
18	Unable to stop engine with ENGINE STOP switch	3-18
7	Water discharge through pressure relief valve	3-10
14	Water pressure gage inoperative	3-15

All data on pages 3-3 and 3-4 deleted.

3-3. DIRECT SUPPORT MAINTENANCE TROUBLESHOOTING TABLE

Table 3-1. Direct Support Troubleshooting

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

2. ENGINE OPERATES ERRATICALLY - 215cc ENGINE

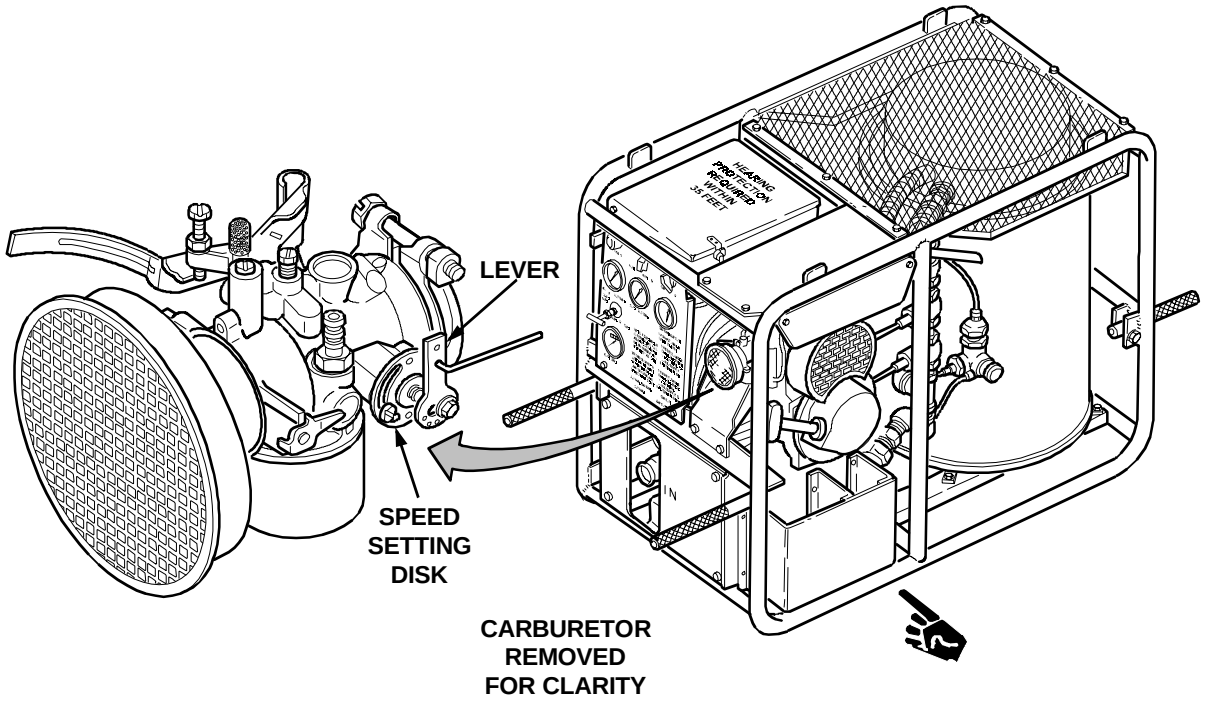
Step 1. Set throttle on carburetor to maximum speed and push lever at speed setting disk toward engine, then release. Lever should snap back quickly and without binding.

If lever snaps back without binding, go to step 3; if not, continue with step 2.

Step 2. Remove carburetor (page 2-53) and repeat step 1.

If lever does not snap back, repair carburetor (page 2-54), checking for broken spring, improper assembly, other damaged or worn parts.

After repairs have been completed, perform engine speed adjustment procedure (page 2-51).



3-3. DIRECT SUPPORT MAINTENANCE TROUBLESHOOTING TABLE - Continued

Table 3-1. Direct Support Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
2. ENGINE OPERATES ERRATICALLY - 215cc ENGINE - Continued
Step 3. Perform engine compression test as follows: a. Remove spark plug. b. Install cylinder compression tester in spark plug hole. c. Vigorously pull starter handle several times. d. Read compression gage.
Replace engine (page 3-36) if compression of less than 100 psi is indicated.
Step 4. Remove and disassemble clutch (page 3-120) and inspect for worn bearings, loose or broken clutch springs, or worn clutch shoes.
Repair clutch by replacement of defective clutch components.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

3. ENGINE OVERHEATS - 215cc ENGINE

Step 1. Remove three screws (1) and Ny-Drive (2). Remove plastic fan guard (3). Check for broken fan blades. Check for accumulation of dirt and debris on fan blades or in plastic fan guard (3).

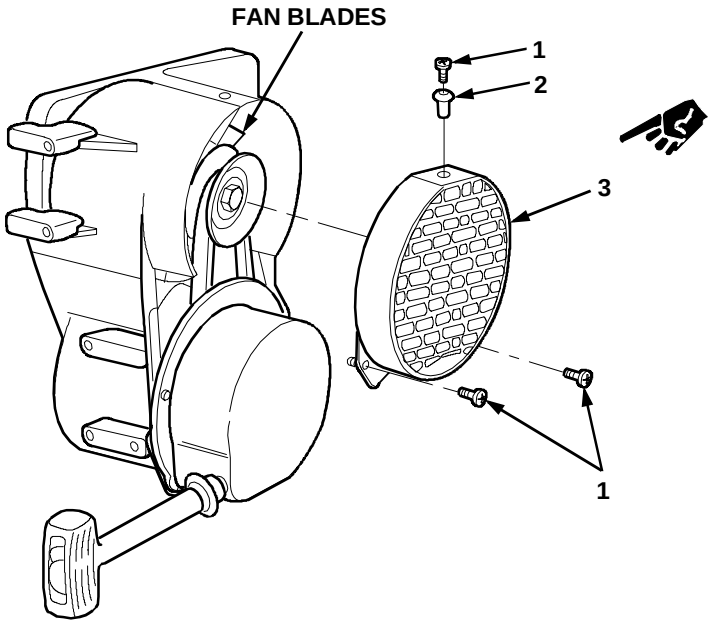
Remove dirt and debris from fan blades and plastic fan guard. Reinstall plastic fan guard (3).

Step 2. Check for excessive build-up of carbon in the exhaust port.

Remove carbon from engine (page 3-115).

Step 3. If trouble persists, engine probably has suffered catastrophic failure.

Replace engine (page 3-36).



3-3. DIRECT SUPPORT MAINTENANCE TROUBLESHOOTING TABLE - Continued

Table 3-1. Direct Support Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION

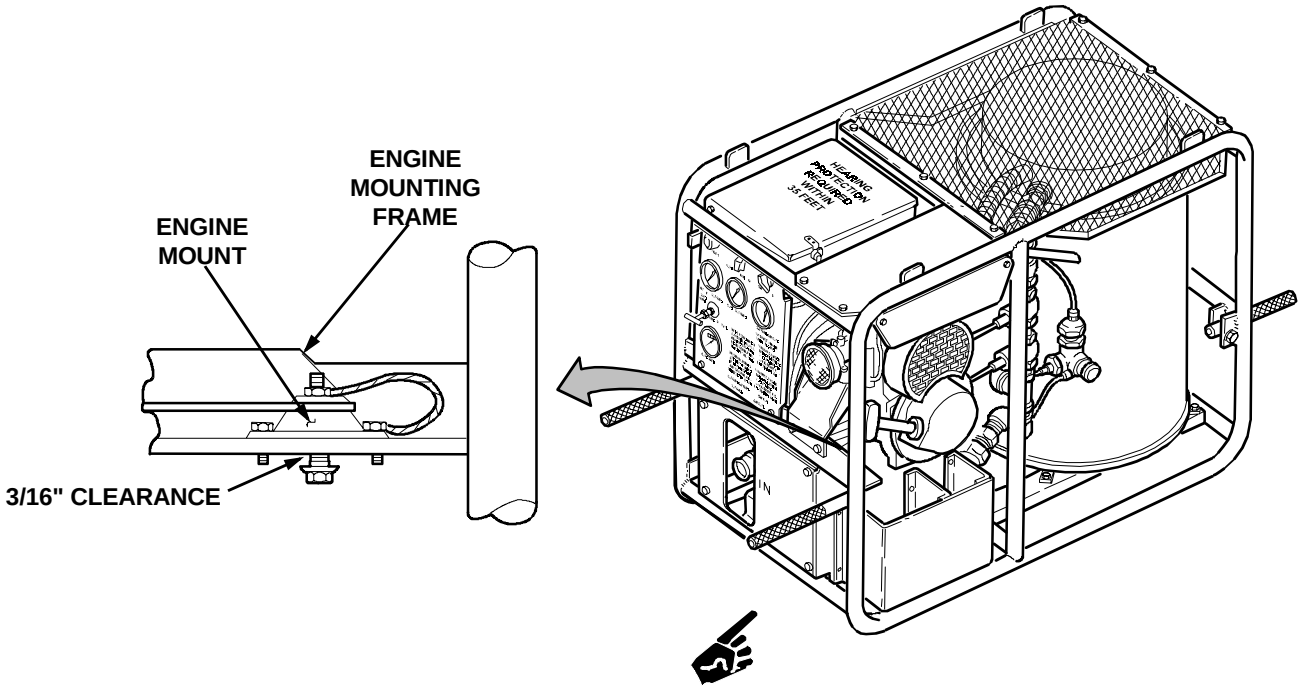
4. EXCESSIVE NOISE AND VIBRATION - 215cc ENGINE

Step 1. Check for damaged muffler.

Replace muffler (page 2-46.2) if unserviceable.

Step 2. Check for torn or improperly adjusted engine mounts (four places).

Adjust as necessary (page 2-40); if damaged, replace engine mounts (page 3-106).



Step 3. Check for bent or damaged vanes.

If vanes are missing, the fan is bent, or imbalance is suspected, the fan must be replaced (page 3–39).

Step 4. Check clutch for worn housing, damaged bearings, scored drum, or defective centrifugal member.

If clutch is damaged, replace defective components (page 3-120).

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 5. Remove starter and rotate crankshaft by hand to see if freedom of movement is allowed or if crankshaft is binding.

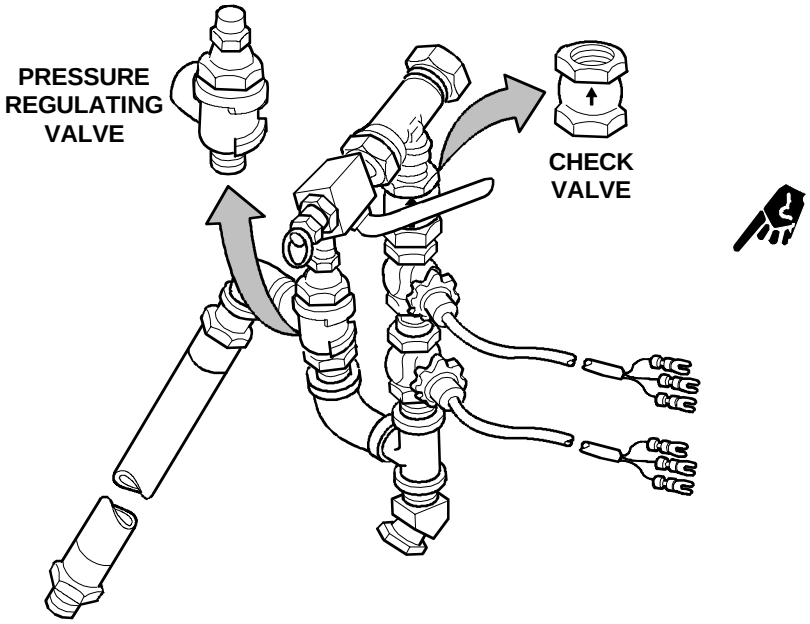
If binding occurs, the engine must be replaced (page 3-109).

5. NO WATER FLOW - NO PRESSURE

Remove coil inlet assembly and replace check valve (page 3-30).

6. LOW WATER FLOW - LOW PRESSURE

Remove coil inlet assembly (page 3-30) and replace check valve (page 3-32). If trouble persists, replace pressure regulating valve (page 2-65).



3-3. DIRECT SUPPORT MAINTENANCE TROUBLESHOOTING TABLE - Continued

Table 3-1. Direct Support Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

7. WATER DISCHARGE THROUGH PRESSURE RELIEF VALVE

Step 1. Check for pressure and temperature indications on control panel. Normal operating temperature is 50 °C in WANDS, using injector; 43 °C in SHOWERS and 117 °C in WANDS, using wands. Normal operating pressure is 130-150 psi in WANDS (wands connected), 45-50 psi in SHOWERS, and 60-70 psi in WANDS when using injector.

a. If normal pressure and temperatures are indicated, replace pressure relief valve as follows:

(1) Unscrew tube (2) from pressure relief valve (1).

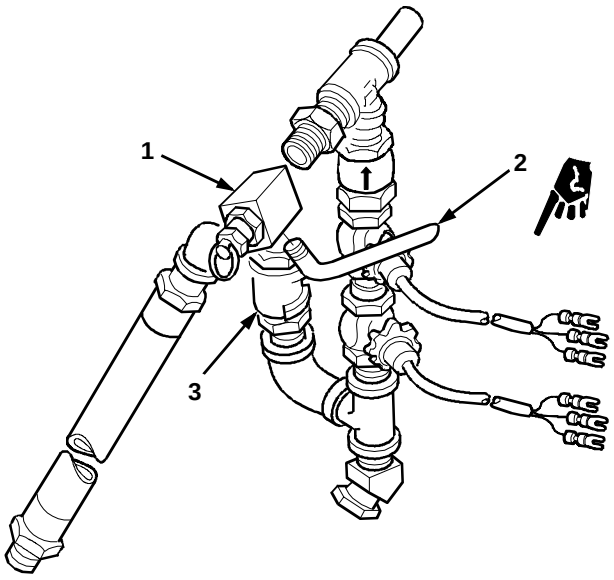
(2) Remove pressure relief valve (1).

(3) Install replacement valve (1) with sealant (item 18, App D).

(4) Install tube (2) with sealant (item 18, App D).

b. If high temperature (above 130 C) and high pressure (above 230 psi) are indicated, remove High Temperature Cut Out (HTCO) switch (page 3-26, step 3) and install replacement switch (page 3-28, step 6).

c. If high pressure (above 230 psi) and normal temperature are indicated, replace pressure regulating valve (3) (page 3-31).



MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

8. NO BURNER FUNCTION - NO IGNITION

WARNING

High voltage is present on this equipment. Injury or death may result if personnel fail to observe all safety precautions.

NOTE

See System Schematic and Wiring Diagram (page F-1) as required.

Step 1. Check for electrical output from engine power generating coil at TB2-2 and TB2-1.

If 7.0 VAC (minimum) is not measured at maximum engine throttle, go to step 1.1.

Step 1.1. Set multimeter to the AC scale 50 volts maximum. Detach the yellow engine electrical output wire from the black transformer input wire at the connector. Measure engine output between yellow wire and engine ground with the engine operating at maximum rpm. Reading should be 23 VAC minimum.

If no reading is observed, the stator must be replaced (page 3-109).

Step 2. Disconnect junction box wiring harness assembly from control module in junction box and check for loose or improperly attached connectors and continuity as follows:

TB2-2	to P1-Z	TB1-9	to P1-G
TB2-4	to P1-Y	TB1-10	to P1-J
TB1-12	to P1-X	TB1-6	to P1-C
TB1-11	to P1-A	TB1-4	to P1-b
TB1-7	to P1-D	TB1-5	to P1-B
TB1-8	to P1-F	TB1-3	to P1-a
TB2-6	to P1-M	TB2-5	to P1-L
TB2-14	to P1-W	TB2-13	to P1-V
TB2-12	to P1-P	TB2-11	to P1-N

If continuity is not measured in all tests, tighten attaching screws and/or crimp-on terminals as necessary.

If trouble persists, replace wiring harness (item 13, page 3-83).

3-3. DIRECT SUPPORT MAINTENANCE TROUBLESHOOTING TABLE - Continued

Table 3-1. Direct Support Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

8. NO BURNER FUNCTION - NO IGNITION - Continued

Step 3. Check for loose or improperly attached connectors and measure continuity of system wiring harness at following check points:

NOTE

Removal of bracket switch guard (page 3-92) is necessary to gain access to TB3.

TB2-3	(Wire No. 41)	to	SW1A3-1	(Function Switch)
TB2-4	(Wire No. 42)	to	SW1A3-2	(Function Switch)
TB1-12	(Wire No. 43)	to	SW1A1-1	(Function Switch)
TB1-11		to	TB3-8	
TB3-6		to	TB2-14	
TB3-5		to	TB2-13	
TB3-4		to	TB2-12	
TB3-3		to	TB2-11	

If continuity is not measured in all tests, tighten attaching screws and/or loosen crimp-on terminals as necessary.

Replace system wiring harness (page 3-20) if lack of continuity continues in any of the above tests.

Step 4. Check flow switch FS1 (bottom switch) as follows:

a. Disconnect nut and remove flow switch element from main body of flow switch.

b. Check flow switch for dirt accumulation, broken spring and freedom of movement of all parts.

c. Disconnect flow switch lead at TB1-7 and check continuity between disconnected lead (22) and TB1-8 while pressing in on switch sleeve. (Switch is defective if continuity is absent when switch is closed (spring depressed).)

Replace flow switch, if defective, connecting lead 22 to TB1-7, 23 to TB1-8 and 21 to TB1-1. Secure switch cable with tiedown straps (item 23, App D).

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

8. NO BURNER FUNCTION - NO IGNITION - Continued

Step 5. Disconnect jumper wire 12 from TB3-12; turn function selector switch to WANDS and measure continuity as follows. Reinstall jumper wire when check is completed.

TB2-3 to TB2-4
TB3-12 to TB1-12

If continuity is not measured, repair, replace or tighten jumper wires 14 and 16.

Replace function selector switch (page 3-94) if lack of continuity continues.

Step 6. Check fuel valve assembly by temporarily disconnecting lead 28 from TB1-5 and measuring for continuity between TB1-3 and disconnected wire lead.

Replace fuel valve assembly (page 3-88), if open. (Normal resistance is approximately 7.7 ohms.)

Step 7. With system operating in WANDS, check for DC voltage between TB1-12 and TB2-1 (ground).

Replace control module (page 3-82), if minimum of 3.5 VDC is not measured.

Step 8. With system operating in WANDS, check High Temperature Cut Out (HTCO) switch by measuring DC voltage at TB3-10 with ground at TB1-3.

If a minimum of 3.5 VDC is not measured, replace HTCO switch. (Removal is described on page 3-26, step 3; installation of switch is found on page 3-28, step 6.)

Step 9. With system operating in WANDS and wands connected, check Low Pressure Cut Out (LPCO) switch by measuring DC voltage at TB3-9, with ground at TB1-3.

Replace manometer assembly (page 3-22) if minimum of 3.5 VDC is not measured.

Step 10. With system operating in WANDS and wands connected, check High Pressure Cut Out (HPCO) switch by measuring DC voltage at TB3-8, with ground at TB1-3.

Replace manometer assembly (page 3-22) switch if 3.5 VDC (minimum) is not measured.

Step 11. Recheck all wiring (see System Schematic and Wiring Diagram, page F-1).

Replace control module (page 3-82) if trouble persists.

3-3. DIRECT SUPPORT MAINTENANCE TROUBLESHOOTING TABLE - Continued

Table 3-1. Direct Support Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

9. LOW OR ERRATIC BURNER OUTPUT

Step 1. Check for inoperability of the fuel valve assembly.

Replace valve if defective (page 3-96).

Step 2. Check for defective flow switch (FS2). (Flow switch is checked as in MALFUNCTION 8 step 4, page 3-12.) Note that this is the top switch (FS2).

Replace switch (if defective); connect terminals as follows:
Wire 24 to TB1-2
Wire 25 to TB1-9
Wire 26 to TB1-10

If trouble persists replace fuel valve assembly (page 3-88).

10. BURNER CYCLES EXCESSIVELY

NOTE

Burner cycling is normal in WANDS but can be reduced in showers by adjusting fuel valve assembly.

Step 1. Check for inoperable fuel valve assembly (valve is inoperable if burn rate cannot be controlled).

Replace fuel valve assembly (page 3-88).

If trouble persists replace one or both check valves (page 3-86).

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

11. TEMPERATURE TOO HIGH (SHOWERS)

Replace Low Temperature Cutout (LTCO) switch if this condition exists. Step 2 (page 3-26) describes removal and step 5 (page 3-28) installation of switch.

12. TEMPERATURE TOO HIGH (WANDS ONLY)

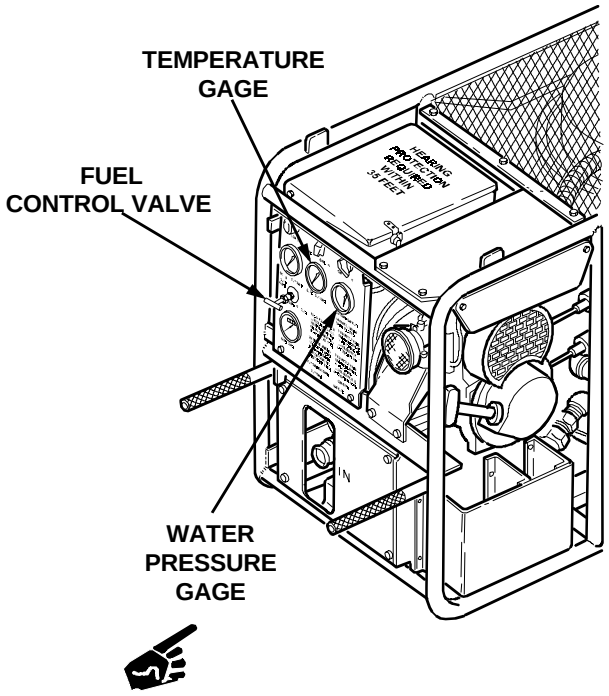
Replace High Temperature Cutout (HTCO) switch if this condition exists. Step 3 (page 3-26) describes removal and step 6 (page 3-28) installation of switch.

13. BURNER CONTINUES TO OPERATE

With system operating, close fuel control valve assembly fully counterclockwise.

If burner continues to operate, replace fuel control valve assembly (page 3-88).

If burner goes out, replace one or both check valves (page 3-86).



14. WATER PRESSURE GAGE INOPERATIVE

NOTE

Pressure gage is an integral part of manometer assembly.

Replace manometer assembly (page 3-22) if this condition exists.

3-3. DIRECT SUPPORT MAINTENANCE TROUBLESHOOTING TABLE - Continued

Table 3-1. Direct Support Troubleshooting - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

15. NO HEATING (SHOWERS Only)

Step 1. Replace Low Temperature Cutout (LTCO) switch if this condition exists. Step 2 (page 3-26) describes removal and step 5 (page 3-28) installation of switch.

Step 2. Refer to System Schematic and Wiring Diagram (page F-1) and check function selector switch for continuity between switch contacts. (Be sure system is shut down and FUNCTION SELECTOR is in OFF position.)

Replace function selector switch (page 3-94) if continuity is not measured across each switch segment, SW1A1, SW1A2, and SW1A3.

16. RESET LAMP IS OFF WHEN BURNER FAILS TO IGNITE

NOTE

Removal of switch guard (page 3-92) is necessary for access.

Refer to System Schematic and Wiring Diagram (page F-1) as necessary.

Step 0.1. Replace electronic control module (page 3-82).

If trouble persists, proceed to step 1.

Step 1. Check jumper (wire 35) by measuring continuity between light module on PUSHBUTTON, contact X2 and TB3-6.

If open, tighten jumper connections; replace jumper if wire remains open.

Step 2. Check jumper (wire 36) by measuring continuity between light module on PUSHBUTTON, contact X1 and TB3-5.

If open, tighten jumper connection; replace jumper if still open.

Step 3. Check system wiring harness by measuring continuity between the following points.

TB3-6 to TB2-14
TB3-5 to TB2-13

If continuity is not measured in both tests, tighten connections; if there is still no continuity, replace wiring harness (page 3-20).

If continuity is measured in both tests, replace junction box wiring harness (item 13, page 3-85).

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

17. UNABLE TO RESET AT RESET PUSHBUTTON (Automatic Shutdown)

NOTE

Removal of switch guard (page 3-92) is necessary for access.

Refer to System Schematic and Wiring Diagram (page F-1) as necessary.

Step 1. Check continuity across reset switch contacts (contacts 1 and 2).

Replace switch (page 3-92) if open.

Step 2. Check continuity of jumper wire between TB3-4 and reset switch, contact 1.

If open, tighten connection; replace wire if still open.

Step 3. Check continuity of jumper wire between TB3-3 and PUSHBUTTON switch, contact 2.

If open, tighten connection; replace wire if still open.

Step 4. If still unable to reset, replace control module (page 3-82).

Step 5. Check continuity of system wiring harness by measuring continuity as follows:

TB3-4 to TB2-12
TB3-3 to TB2-11

If continuity is not measured in either test, tighten connections and if wire remains open, replace wiring harness (page 3-20).

3-3. DIRECT SUPPORT MAINTENANCE TROUBLESHOOTING TABLE - Continued

Table 3-1. Direct Support Troubleshooting - Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

18. UNABLE TO STOP ENGINE WITH ENGINE STOP SWITCH.

Step 1. With system off and switch in DOWN position, check continuity through switch at TB3-13 and TB3-14.

If continuity is not measured, replace switch (page 3-92).

Step 2. Check for continuity between TB3-14 and any good solid ground on engine.

If continuity is not measured, check/replace engine ground wire, number 80.

If continuity is measured, check/replace wire (page 3-40.2)

NOTE

Partial disassembly of engine (page 3-109) will be necessary to replace wire.

19. BOTH JETS ON (Only One Wand Activated)

Replace flow switch (FS2), MALFUNCTION 9, step 2 (page 3-14) if this condition exists.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

20. ENGINE FAILS TO START OR STOPS - 215cc ENGINE

NOTE

When testing the different electrical components, there is one that cannot be tested accurately. It is the amplifier. If all the other components test "good," the amplifier unit can then be assumed to be the problem.

Step 1. Check if engine turns, using recoil starter.

If engine is seized (cannot be turned), perform engine block/cylinder repair procedure (page 3-115). Possible faults are seized bearings, damaged rings/piston, and broken connecting rod.

Step 2. Deleted

Step 3. Check for incorrect ignition timing.

Set ignition timing by aligning timing marks on stator plate (page 3-111).

21. ENGINE RUNS ROUGHLY – 215cc ENGINE

Step 1. Perform engine compression test as follows:

a. Remove spark plug.

3-3. DIRECT SUPPORT MAINTENANCE TROUBLESHOOTING TABLE - Continued

Table 3-1. Direct Support Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
21. ENGINE RUNS ROUGHLY – 215cc ENGINE - Continued	
b. Install cylinder compression tester in spark plug hole. c. Vigorously pull starter handle several times. d. Read compression gage.	Disassemble and replace head gasket if compression of less than 105 psi is indicated (page 3-115). If the cylinder is scored, replace engine (page 3-36).
Step 2. Remove and disassemble clutch (page 3-120) and inspect for worn bearings, loose or broken clutch springs or worn clutch shoes.	Repair clutch by replacing defective clutch components.
22. Deleted	
23. Deleted	

All data on page 3-18.3/(3-18.4 blank) deleted.

Section II. DIRECT SUPPORT MAINTENANCE REPAIR PROCEDURES

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Engine Assembly Maintenance	3-44
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Engine and Kit Installation - 215cc Engine	3-123

3-4. GENERAL

This section contains the procedures for maintaining the components which are the responsibility of Direct Support Maintenance. See above index.

WARNING

Be sure you read all WARNINGS on the WARNING pages before you start your maintenance procedures.

Cleaning solvent is toxic and flammable. Use only in a well ventilated area. Avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts and avoid skin contact.

3-5. PUMP/HEATER ASSEMBLY MAINTENANCE

This task consists of: **Repair**
- **a. Replacement of Wiring Harness Assembly**
- **b. Replacement of Manometer Assembly**
- **c. Replacement of Fuel Pump Drive**

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)

Materials Required:
Cleaning Solvent, (Item 21, App D)
Brush, Varnish (Item 4, App D)
Tiedown Straps (Item 23, App D)

Equipment Condition:
Engine shut down and cold

a. Replacement of Wiring Harness Assembly

NOTE

Refer to System Schematic and Wiring Diagram (page F-1) as necessary.

(1) Remove safety guard assembly (page 3-100).

(2) Gain access to terminal boards TB1 and TB2 in junction box (4) and disconnect wires as follows:

Connecting Point	Wire Number
TB2-3	41
TB2-4	42
TB2-11	48
TB2-12	47
TB2-13	46
TB2-14	45
TB1-11	44
TB1-12	43

(3) Cut tiedown straps, securing wiring harness assembly (3) to junction box internal wiring harness assembly.

(4) Carefully pull wiring harness assembly out of junction box.

(5) Open tool box door (2) and remove switch guard (1) (page 3-92).

(6) Disconnect wires as follows:

Connecting Point	Wire Number
TB3-3	48
TB3-4	47
TB3-5	46
TB3-6	45
TB3-8	44
SW1A1-1 (Function Selector Switch)	43
SW1A3-2 (Function Selector Switch)	42
SW1A3-1 (Function Selector Switch)	41

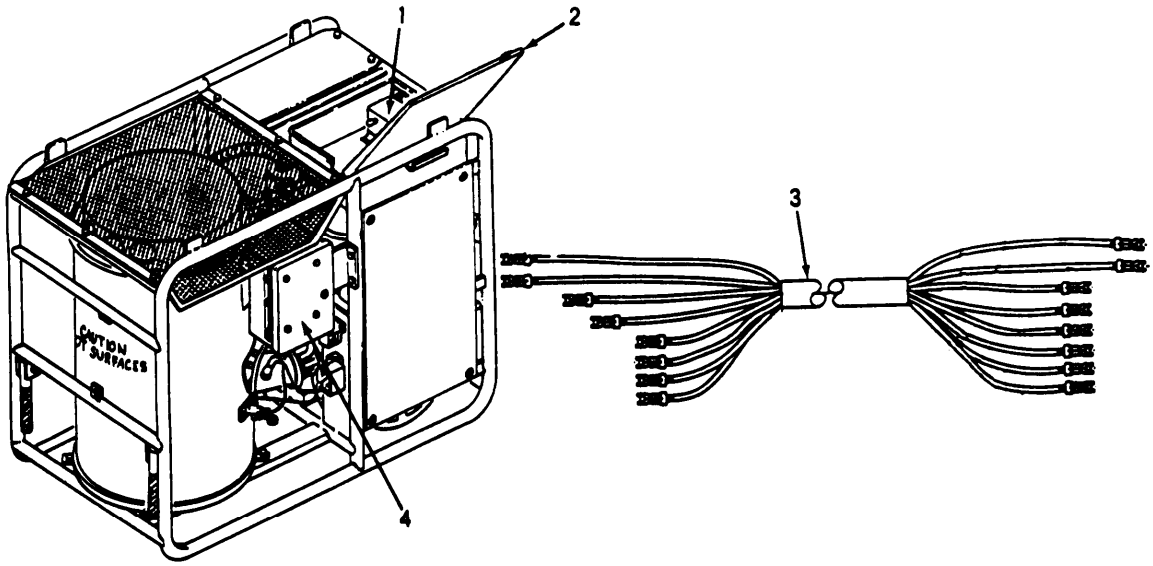
(7) Clean all contact points with cleaning solvent and brush and inspect all parts for serviceability.

(8) Route replacement wiring harness assembly to control panel components and junction box (4) and connect as indicated in steps 2 and 6 above.

(9) Reinstall switch guard (1) and close tool box door (2).

(10) Secure wiring harness to existing harness (part of junction box assembly) with two tie-down straps.

(11) Close junction box door.



3-5. PUMP/ HEATER ASSEMBLY MAINTENANCE - Continued

b. Replacement of Manometer Assembly

NOTE

Refer to System Schematic and Wiring Diagram (page F-1) as necessary.

(1) Remove safety guard assembly (page 3-100).

(2) Open tool box door, remove switch guard (1) (page 3-92) and disconnect cable (8) (wires numbered 17, 18, 19 and 20) from TB3, contacts 8, 9 and 10.

(3) Carefully pull wires out of tool box.

(4) Unscrew sensing unit (4) at outlet assembly (3).

(5) Remove two screws (11) and washers (10), securing manifold (9) from air inlet of heat exchanger.

(6) Remove two thumbnuts (7) and bracket (6).

(7) Carefully pull manometer assembly away from pump/heater assembly through cutout in control panel.

(8) Clean all mounting surfaces with cleaning solvent and inspect mounting hardware for serviceability. Discard all unserviceable parts.

CAUTION

Tube, connecting main body of manometer assembly with sensing unit, is filled with fluid and fragile, excessive bending can crimp or break lines. Handle carefully.

(9) Carefully thread manometer assembly through cutout in control panel and position on pump and heater assembly. Secure manifold assembly (9) to air inlet assembly of heat exchanger with two screws (11) and washers (10).

(10) Secure gage (5) to front panel with bracket (6) and thumbnuts (7).

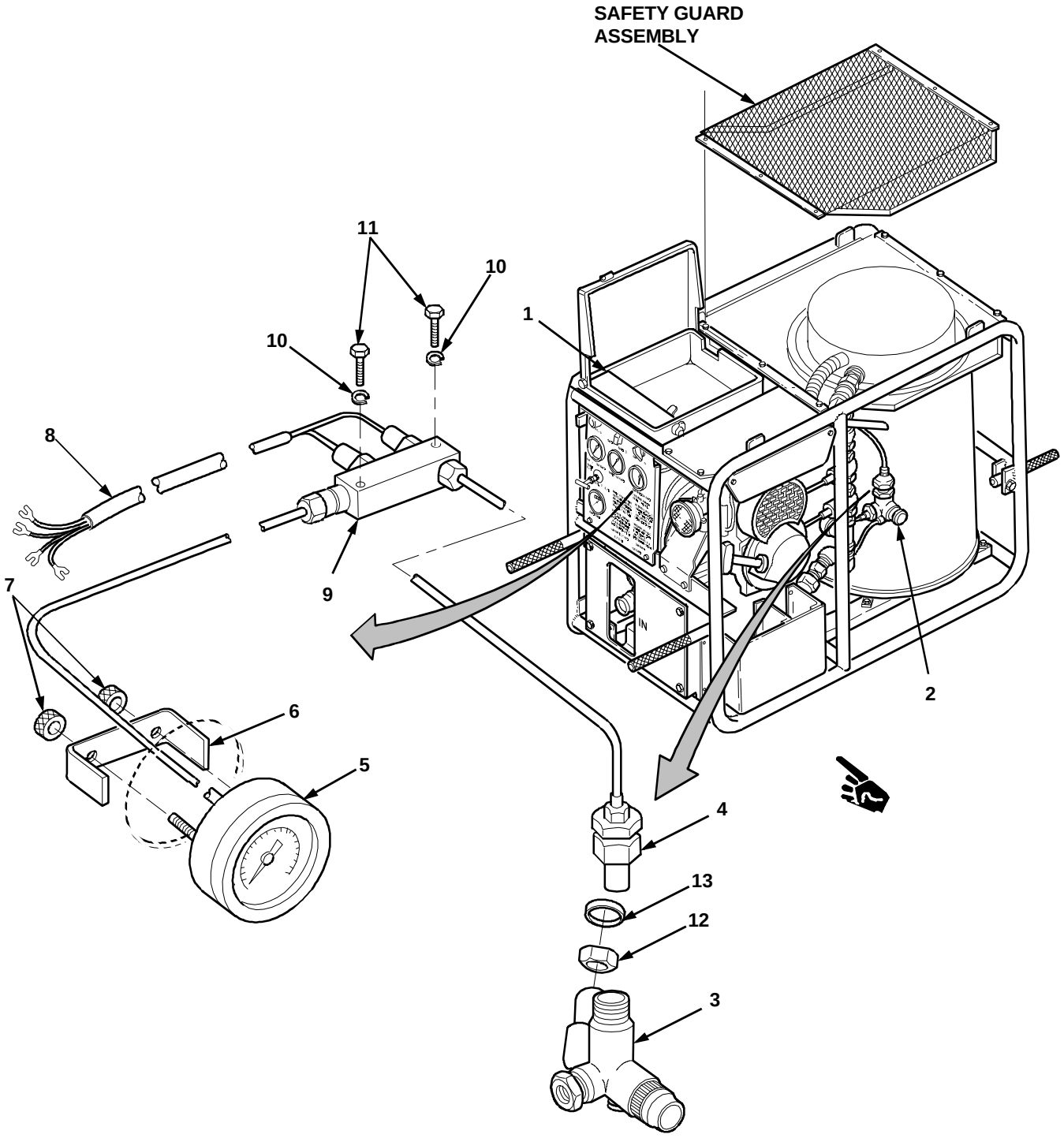
(11) Install sensing unit (4) to outlet assembly (3) using nut (12) and compression sleeve (13).

(12) Route cable (8) into junction box assembly and connect as follows:

Wire Number	Connecting Point
20 (Red)	TB3-8
19 (Red)	TB3-9
18 (White)	TB3-9
17 (White)	TB3-10

(13) Reinstall switch guard (10) (page 3-94).

(14) Reinstall safety guard assembly (page 3-102).



3-5. PUMP/HEATER ASSEMBLY MAINTENANCE - Continued

c. Replacement of Fuel Pump Drive

(1) Remove panel (6) (page 2-32) and fuel pump belt (page 2-26).

(2) While holding water pump pulley, loosen nut (4) and lockwasher (3) and remove.

(3) Loosen two setscrews on fuel pump drive (2) and remove drive.

(4) Remove three screws (5) and shouldered shaft (1).

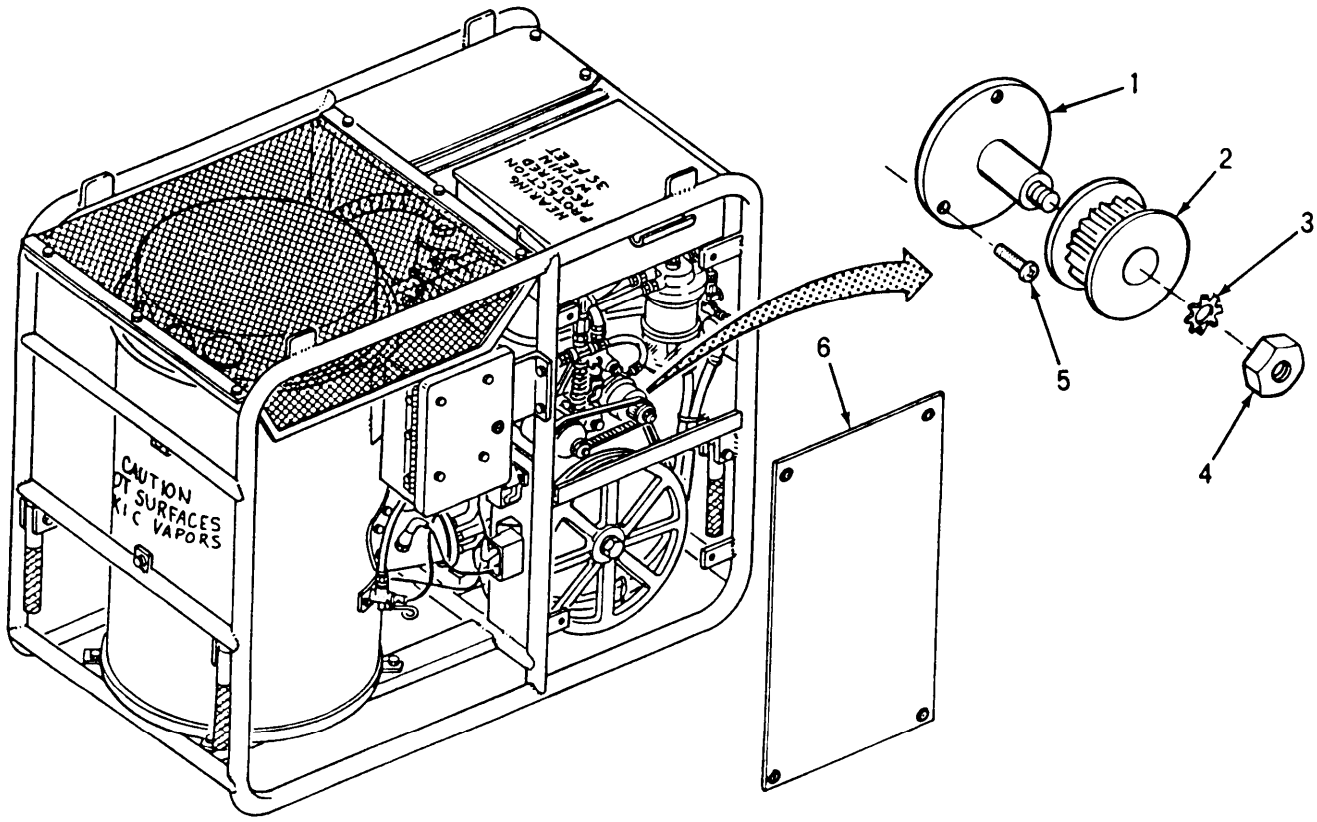
(5) Clean drive mounting surfaces and all removed parts with cleaning solvent and brush and inspect for wear and damage. Discard unserviceable parts.

(6) Install shouldered shaft (1) on fan assembly hub and secure with three screws (5).

(7) Install drive (2) on shaft and secure with two integral setscrews.

(8) Install lockwasher (3) and nut (4). Tighten nut while holding water pump pulley.

(9) Reinstall fuel pump belt (page 2-26) and panel (6) (page 2-32).


1
2
3
4
5
6

3-6. OUTLET ASSEMBLY MAINTENANCE

This task consists of: **Repair**
a. Disassembly and Removal
b. Assembly and Installation

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-90-N26)

Materials Required:
Insulating Compound (Item 8, Appendix D)
Locking Compound (Item 6, Appendix D)
Brush, Varnish (Item 4, Appendix D)
Cleaning Solvent (Item 21, Appendix D)
Sealing Compound (Item 7, Appendix D)
Tiedown Straps (Item 23, Appendix D)

Equipment Condition:
Engine shut down and cold.

a. Disassembly and Removal.

(1) Open tool box door and remove switch guard (page 3-92).

(2) Remove low temperature cutout switch (10), disconnecting wire number 12 from TB3-12 and wire number 13 from TB3-11 and unscrewing switch from multiple connector (4).

(3) Remove high temperature cutout switch (11), disconnecting wire number 10 from TB3-10 and wire number 11 from TB3-12 and unscrewing it from multiple connector.

(4) Disconnect temperature bulb (14) from thermometer adapter (15). (No tools required.)

(5) Disconnect pressure sensing unit (2) of manometer assembly from connector (4).

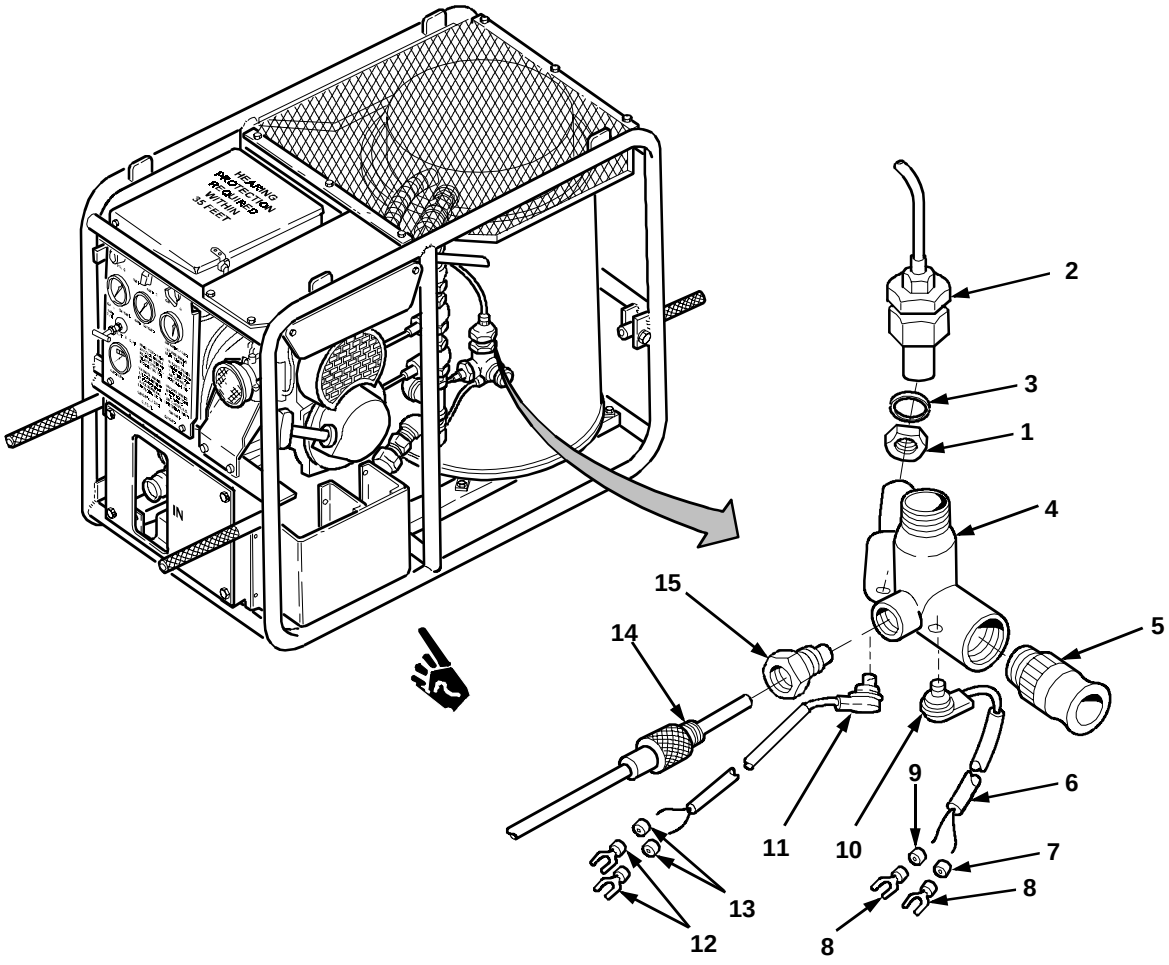
(6) Unscrew nut (1) from heat exchanger and remove connector (4) from heat exchanger.

(7) Remove nut (1) and compression sleeve (3). It may be necessary to cut sleeve (3) from connector (4) to remove nut (1).

(8) Remove coupling half (5) from connector (4).

(9) Remove thermometer adapter (15).

(10) Clean all parts with cleaning solvent and brush and inspect for serviceability.



3-6. OUTLET ASSEMBLY MAINTENANCE - Continued

b. Assembly and Installation

(1) Coat threads of adapter (15) and coupling half (5) with locking compound and install on multiple connector (4).

(2) Install connector (4) on heat exchanger with nut (1) and compression sleeve (3).

(3) Coat bulb (14) of temperature gage with insulating compound and install in adapter (15) of outlet assembly. Hand tighten.

(4) Reconnect sensing unit (2) of manometer assembly to top of connector (4).

(5) Install low temperature cut-out switch (10) as follows:

(a) Apply a coat of insulating compound to unthreaded part of switch assembly (10), area B.

(b) Apply a light coat of sealing compound to threads, area A, of switch assembly (10).

(c) If required (i.e., new switch), install sleeving (6), terminals (8), and markers (7 and 9).

(d) Route switch wires to junction box and secure wire number 12 to TB3-12 and wire number 13 to TB3-11. Secure with tiedown straps as required.

(6) Install high temperature cut-out switch (11) as follows:

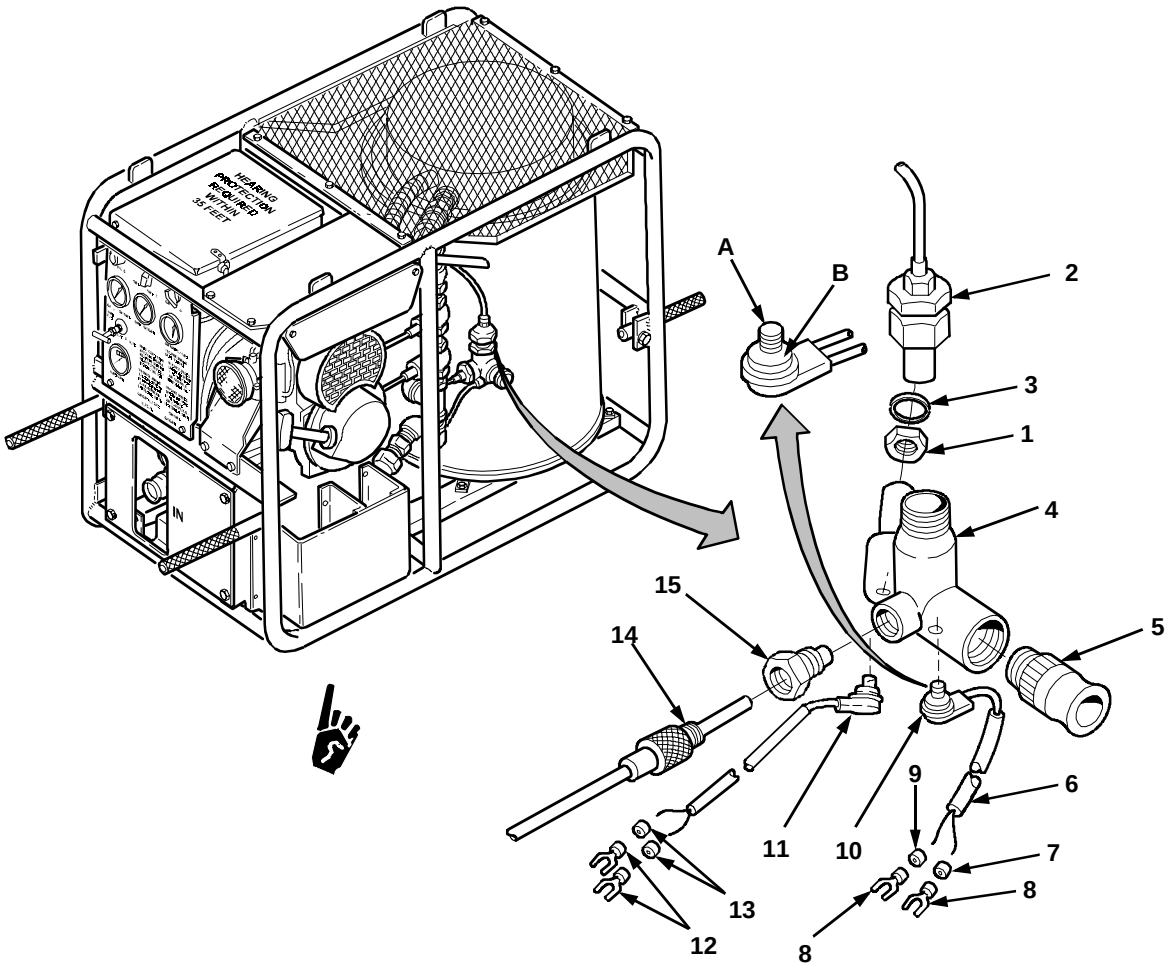
(a) Apply a coat of insulating compound to unthreaded part of switch assembly (11) on area B.

(b) Apply a light coat of sealing compound to threads, area A, of switch assembly (11).

(c) If required (i.e., new switch), install sleeving (6), terminals (8), and new markers (12 and 13). Secure with tiedown straps as required.

(d) Route switch wires to junction box and secure wire number 10 to terminal board, TB3-10 and wire number 11 to TB3-12.

(e) Reinstall switch guard (page 3-92).


HEARING PROTECTION REQUIRED WITHIN 35 FEET
A
B
2
3
1
4
5
15
14
6
9
11
10
7
8
13
12
8

3-7. COIL INLET ASSEMBLY MAINTENANCE

This task consists of: **Repair**
a. Disassembly and Removal
b. Assembly and Installation
c. Adjust

INITIAL SETUP:

Tools Required:
Tool Kit, General Mechanics, Automotive (SC 5180-95-N26)
Shop Equipment, Automotive Org. #1, Common (SC 4910-95-A74)

Materials Required:
Cleaning Solvent (Item 21, App D)
Brush, Varnish (Item 4, App D)
Sealant, Pipe (Item 18, App D)
Adhesive, RTV (Item 2, App D)
Compound, Locking (Item 6, App D)

Equipment Conditions:
Engine shut down and cold

Repair

a. Disassembly and Removal

NOTE

Heating of components may be necessary to break threaded joints.

(1) Disconnect flow switch (9) wires from junction box assembly (TB1-7, wire 22, TB1-8, wire 23, and TB1-1, wire 21) and carefully pull out of junction box.

(2) Unscrew flow switch core from main body of flow switch assembly (9) by unscrewing nut (22). Identify nut (22) with bottom flow switch (FS1).

(3) Disconnect flow switch (7) wires from junction box assembly (TB1-10, wire 26, TB1-9, wire 25, and TB1-2, wire 24).

(4) Unscrew flow switch core from main body of flow switch assembly (7) by disconnecting nut (21). Identify nut (21) with top flow switch (FS2).

(5) Disconnect hose assembly (24) from 45° elbow (12) at swivel, and disconnect hose assembly (23) at water inlet swivel.

(6) Loosen nut (30) and remove remaining components of coil inlet assembly as a unit.

NOTE

Before further disassembly note approximate alignment of components. This will be important for reassembly.